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ABSTRACT

This report is the second of the annual reports prepared by this Committee. The Committee addressed itself in this report primarily to what it viewed as the most pressing issue - making recommendations for the number of individuals who should be supported by the research training programs of the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration during fiscal years 1977 and 1978 in each of four broad fields: basic medical sciences, behavioral sciences, clinical sciences, and health services research. Chapter I presents an introduction and recommendation. Chapter II is a national overview of research training the biomedical and behavioral sciences. Chapter III is an assessment of manpower needs. Chapter IV considers future directions; included are four areas the Committee believes need further attention. Also included are extensive appendices with related information. (RH)

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SE 022 497

PERSONNEL NEEDS AND TRAINING FOR BIOMEDICAL AND BEHAVIORAL RESEARCH

THE 1976 REPORT

of the

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

COMMISSION ON HUMAN RESOURCES

NATIONAL RESEARCH COUNCIL

National Academy of Sciences
Washington, D.C.
1976

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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May 7, 1976

The Honorable David Mathews
Secretary of Health, Education, and Welfare
Washington, D. C. 20201

My dear Mr. Secretary:

I am pleased to present to the Department of Health, Education, and Welfare the 1976 report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel. It is the second annual report in the continuing study undertaken by the National Research Council pursuant to Title I of the National Research Act of 1974 (PL 93-348). The work has been supported under Contract NO1 OD 5 2109 with the National Institutes of Health.

The Act states (Section 473 (a)) that the purposes of the study are to: "(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel; (2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel; (3) identify the kinds of research positions available to and held by individuals completing such programs; (4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under paragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and (5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1)."

In the eleven months that have elapsed since the submission of the 1975 report, the Committee has increased its ability to respond to these requirements. The present report, unlike the 1975 report, contains recommendations for departures from the prevailing training levels in three of four broad training areas as well as for redistribution of training funds between predoctoral and postdoctoral appointments. Nevertheless, much remains to be done before the Committee will have achieved its goal of responding fully to the requirements of the Act. I trust that the year ahead will see further progress toward this goal.

We shall be glad to discuss the report with you and your staff.

Sincerely yours,

P Handler

Philip Handler
President

Enclosure

PREFACE

This 1976 report is the second of the annual reports prepared by the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel in a continuing study that was established pursuant to the provisions of the National Research Service Award Act of 1974 (Public Law 93-348). The report presents the results of work by the Committee and its advisory panels and staff on a limited number of questions of pressing importance. The broader set of complex issues addressed by the Act and summarized in the opening pages of Chapter 1 will guide the Committee in its future activities.

The Committee addressed itself in this report primarily to the most pressing issue, that of making specific recommendations for the number of individuals who should be supported by the research training programs of the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration during fiscal years 1977 and 1978 in each of four broad fields: basic biomedical sciences, behavioral sciences, clinical sciences, and health services research. In addition, the Committee has made specific recommendations with regard both to the numbers to be supported at the various academic levels of training and to the mechanisms by which funding should be provided. The Committee will monitor the effectiveness and impact of its current set of recommendations over the coming year. It has also developed a set of goals and planned a set of supporting activities that will permit a wider array of issues to be studied and reported upon in the ensuing annual reports.

Because this report is one of a continuing series, the reader is referred to the first annual report, that for 1975, as well as to the report of the feasibility study issued in February 1975 (see Bibliography) for details concerning the history of the Committee, its organization, activities, and previous recommendations. The earlier reports treat the principles that underlie research training and the problems that are inherent in studies of professional personnel. They also contain discussions of the relationship of federally supported research training programs to health research and health care needs of the nation, the history of the growth of federally supported research training, and a description of some characteristics and activities of National Institutes of Health-supported trainees and fellows. Although no attempt has been made to duplicate such information in the current report, Chapter 2 enlarges upon the principles enunciated previously, while

Chapter 3 develops and refines the issues related to personnel supply and to national needs and market demands. Chapter 4 relates the provisions of the Act to areas that will require special attention by the Committee in its continuing study.

Central to all of these efforts is the fundamental issue of the degree or extent to which it is possible and useful to define and establish human-resource requirements for increasingly fine fields of specialization within the biomedical and behavioral sciences. In addition, the Committee is fully aware that the overall effectiveness of the nation's biomedical and behavioral research enterprise is directly dependent upon the quality of the personnel who are trained to conduct such research as well as to teach others research skills. The Committee recognizes the need to improve the quality both of individual investigators and of the academic environment in which research training is provided. Both of these considerations--specification of personnel needs in the subfields and enhancement of the quality of the trainees and of the training process--will guide the Committee's future efforts to respond more fully to the tasks established by the legislation.

Robert J. Glaser, M.D.
Chairman

ACKNOWLEDGMENTS

Since its inception, the Committee has benefited from the support, advice, and information provided by other organizations concerned with personnel studies and activities. In particular, the Committee acknowledges the assistance of the Association of American Medical Colleges, the American Medical Association, various professional societies and associations that have both volunteered and responded to requests for assistance, and many units and offices within the National Science Foundation and the Bureau of Labor Statistics.

The Committee wishes to acknowledge the help provided by Donald S. Fredrickson, M.D., Director of the National Institutes of Health, and James D. Isbister, Administrator of the Alcohol, Drug Abuse, and Mental Health Administration, together with senior members of their staffs, who have met with the Committee for informal discussions and have provided much useful information.

The Committee is especially indebted to the chairmen and members of its five panels for their intensive efforts under severe time constraints to address complex issues and provide the advice that the Committee required in order to arrive at its final recommendations.

The Committee has maintained a close and active interest in the work of the President's Biomedical Research Panel, under the chairmanship of Franklin D. Murphy, and of its several interdisciplinary cluster groups. Five members of the Committee and its panels have served on the interdisciplinary cluster groups. The staffs of the two studies have also been in close communication. These joint memberships and liaison arrangements have helped to keep the Committee aware of the general progress of the panels' discussions and of their implications for research personnel issues. Continued liaison with groups that monitor the status, programs, and directions of biomedical and behavioral research funded by the federal government is also planned by the Committee. Only in this way can maximum effectiveness be achieved with whatever federal support is provided to individuals and institutions for training personnel who will participate in and help advance the biomedical and behavioral research programs of the country.

The Committee has had the assistance of many individuals. Recognizing that it is neither possible nor appropriate to cite all such instances, the Committee nonetheless wishes to acknowledge particularly the following: Vincent E. Price, Charles A. Miller, Solomon Schneyer, William H. Batchelor, Joseph A. Brackett, and

William L. Copeland of the National Institutes of Health; David F. Kefauver, Fred Elmadjian, and Michele W. Harvey of the Alcohol, Drug Abuse, and Mental Health Administration; and Daniel Fox and Jean Carmody of the Health Resources Administration. All of them have given generously of their time in providing information, meeting with the Committee and panels, and advising upon federal policy relative to the administration of agency-supported research training programs. Special thanks are accorded to Robert A. Alberty, Chairman of the Commission on Human Resources of the National Research Council, National Academy of Sciences, and William C. Kelly, Executive Director of the Commission, and his immediate staff, who have provided helpful advice and support throughout the Committee's work.

Finally, the Committee acknowledges with pleasure the effective work accomplished by all of its staff, especially Allen M. Singer, who served as Acting Staff Director during the initial 4 months of formation of this report. Other significant contributions were made by Porter E. Coggeshall, Samuel S. Herman, and Robert G. Snyder. Prudence W. Brown, Corazon M. Francisco, Kay C. Harris, and Elizabeth D. Skinner led the efforts of the supporting staff. Superb secretarial support under demanding conditions was provided by Mary P. Barbour, Llyn M. Ellison, and Regina C. Jacobs. Pamela C. Ebert, Executive Secretary for the Behavioral Sciences and Health Services Research panels, made many contributions following her appointment midway in the period covered by this report. Above all, the Committee is deeply indebted to Herbert B. Pahl, who as Staff Director provided leadership in carrying the study forward to its 1976 milestone.

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1. INTRODUCTION AND RECOMMENDATIONS

HISTORICAL OVERVIEW

This report is concerned with national needs for high-quality research personnel in the biomedical and behavioral sciences, with federal and other programs for research training, and with program adjustments necessary to continue providing a cadre of research scientists to meet the future health needs of this country. Research training programs must serve the fields with which such scientists are related. This report endeavors to address these relationships.

Historically, federal interest and involvement in biomedical and behavioral research increased dramatically after World War II, in large measure as a result of the demonstration during the war of the immediate beneficial impact of well-organized basic and clinical research. The introduction of penicillin into the treatment of infectious diseases was a striking example. It became clear that expansion of the country's research efforts was in the broad national interest because of its potential for improving human health and welfare. Congress concluded that substantial federal funding was justified because of the unique importance of health for all Americans. A major national commitment was therefore made to support investigation in the biomedical and behavioral sciences in order to improve the health and well-being of all citizens. The enormous growth in federal research support that ensued during the two decades following the war led to the need for a corresponding commitment to the training of adequate numbers of qualified research personnel.

Initially, the needed scientists were either attracted from other fields or trained through the limited existing postdoctoral support. It was clear, however, that predoctoral support of graduate students would be needed in order to assure a continuing increase in the supply of high-quality researchers in these developing sciences. Hence, training grant and fellowship support in the beginning was directed primarily at augmenting the capability of the educational system to supply additional researchers while also seeking to improve the quality of their training. This system, with the support of federal funding, rapidly developed to the point where it now provides an adequate supply of research personnel equipped to carry out the

national research effort in many of the biomedical and behavioral fields.

In view of the recent lessening rate of federal investment in biomedical and behavioral research, both the executive and legislative branches of government increasingly have sought to determine the level and kinds of research training support that are needed to meet national health needs. Recognizing the responsibility of the federal government to assess these needs while maintaining its vital role in supporting excellence in research training, Congress passed the National Research Service Award Act of 1974 (NRSA Act). This had as one of its primary objectives the continued evaluation of the nation's needs for biomedical and behavioral research personnel. The Act directed the Secretary of the Department of Health, Education, and Welfare to commission such a study by the National Academy of Sciences, which accepted the task and in early 1975 established the present Committee.

The charge given to the Committee under the Act is a formidable one, covering a wide range of issues that over many years and in many ways have been addressed by the Congress, the executive branch, and various professional organizations. In previous attempts to study national health research manpower issues, investigators have stated, and indeed, emphasized, the complexity and difficulty of the task.[1] In its feasibility study (February 1975), a National Research Council (NRC) committee pointed out the complexities of the charge and, in concurrence with the Congressional intent, indicated that a long-term continuing study would be needed to deal with these issues satisfactorily. In the Act[2] the Committee is specifically required to:

(1) establish (a) the nation's overall need for biomedical and behavioral research personnel, (b) the subject areas in which such personnel are needed and the number of personnel needed in each area, and (c) the kinds and extent of training which should be provided for such personnel;

(2) assess the current training programs available for the training of biomedical and behavioral research personnel, including those supported by the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration as well as by other sources;

(3) identify the kinds of research positions available to and held by individuals completing such training;

(4) determine to the extent feasible whether, without NIH and ADAMHA research training support, other programs could provide training to an adequate number of individuals to meet the nation's needs established under item 1 above; and

(5) determine what modifications in current NIH, ADAMHA, and other available training programs are necessary to meet these needs.

In its 1975 report,[3] published only 4 months after the feasibility study, the Committee began to address the issues listed above. It divided the overall areas of biomedical and behavioral research into four fields: basic biomedical sciences, clinical sciences, behavioral sciences, and health services research. However, because of the complexity of the issues being addressed and the short time available to collect and review data, the Committee stated in that report that it did not have a sufficiently firm basis upon which to recommend major changes or adjustments within ongoing training support programs. The Committee concluded, therefore, that until it could review and evaluate both the existing data and the individual viewpoints and judgments of its own members, and those of its advisory panels and other constituents of the research training community, it would be best to maintain unchanged the mechanisms, categories, and support levels of federal funding of research training programs in each of the four aggregate fields identified above. Thus, while recommending no changes, the Committee responded to the first two mandates of the Act.

With regard to the third task specified in the Act, that of identifying the kinds of research positions available to personnel who complete such research training, the 1975 report presented a brief summary of the employment activities of former NIH trainees and fellows. For these data the Committee drew upon the results of a prior study by another NRC committee of the impact of NIH training programs on the career patterns of bioscientists.[4] Chapter IV of the 1975 report addressed the Act's fourth mandate of whether NIH and ADAMHA support of research training is required to meet the nation's needs for research personnel. This was done by examining data collected by the National Science Foundation on other federal and nonfederal programs supporting graduate science students. The impressions gained at that time from this preliminary analysis, although informative, were not conclusive and thus the issue requires further study.

These analytical tasks, though initiated last year, are still basic to the Committee's charge of assessing the national needs for biomedical and behavioral research personnel. Thus they constitute a core of continuing

studies that the Committee will reexamine each year as new data are produced and as new developments take place in the research environment.

REVIEW OF CURRENT STUDIES

It had been anticipated from the start that some of the important issues addressed in the legislation could not be fully dealt with by using existing information. Because of the time constraints imposed for preparing the Committee's reports, it seemed prudent to use these available resources before any new surveys or other extensive data-gathering activities were undertaken. Thus, in preparing the present report, the Committee has relied primarily upon information from other studies of human resources and graduate education and on special tabulations of data which had already been collected. Much of the available information is incomplete, and some of it ambiguous. On some points there is no objective evidence available and the Committee has had to rely almost entirely upon the expert judgment of its advisory panels and the experience of its own members in addressing the complex questions specified in the legislation. The Committee recognizes the hazards of "expert judgment," but believes it has used such judgments cautiously in arriving at its recommendations. Meanwhile, it is proceeding to search out more objective evidence bearing on these issues.

In attempting for this year's report to estimate the overall need for biomedical and behavioral research personnel,[5] the Committee and panels have considered the most recent Ph.D. manpower projections made by the National Science Foundation[6] and the Bureau of Labor Statistics.[7] However, the substantial differences in methodologies and results from these projections have made it difficult for the Committee to draw firm conclusions from them. For its examination of the market for Ph.D. scientists, the Committee has also considered various tabulations and analyses of data from files maintained by the National Research Council.[8]

For the analysis of the market for M.D. researchers, the Committee has examined data from the American Medical Association and the Association of American Medical Colleges.[9] Unfortunately, neither source provided complete information on the total number of M.D.'s and other professional doctorate recipients qualified to conduct clinical research.

The identification of the health services research population in all of the cited data sources also presented particular difficulty since many such researchers have earned doctorates in the traditional biomedical and behavioral disciplines and cannot be distinguished by that

criterion from other persons with similar training who are not so engaged.

In addition to the information relevant to supply and utilization, data for research expenditures in the academic sector have been compiled by the National Science Foundation.[10] Graduate and undergraduate enrollment estimates were obtained from the Office of Education[11] and the National Science Foundation.[12] All of these data have been useful in projecting employment requirements in the academic sector, but the inability to isolate selected subpopulations has made it impossible to separate health-related research positions from other employment opportunities in the biomedical and behavioral sciences.

Information about alternative mechanisms for support of graduate training has been obtained from several sources. The NIH and ADAMHA have furnished much relevant information about their respective training programs, most of which has been included in the Appendixes. A broader perspective of support for graduate education has been obtained from the information collected by a graduate school departmental survey[13] conducted by the National Science Foundation and from the National Research Council's survey of Ph.D. recipients.[14] However, none of these data sources provides the comprehensive picture needed to respond effectively to some of the issues raised by the NRSA Act. For example, as described in Chapter 2, although graduate students typically rely on more than one source of support for their education, no data presently available to the Committee show the extent to which students are dependent upon each source, nor is there adequate information about the distribution or pattern of various training modes throughout the training period of individual students.

Despite the deficiencies cited, the above data sources and the tabulations drawn from them have been quite useful in describing trends in the components of supply and utilization of the Ph.D. labor force in the biomedical and behavioral fields. The Committee has examined these trends and has concluded that the overall needs for these Ph.D.'s are not expected to continue to expand as they did during the 1960's, primarily because of the anticipated stabilization of undergraduate and graduate enrollments and a more modest growth in federal research expenditures. Some evidence of changes in the utilization patterns of recent Ph.D. recipients in these fields has already been noted and is discussed in Chapter 3 of this report. In addition, the age distribution of the current biomedical and behavioral Ph.D. labor force is rather young and the indications are that relatively few individuals will retire from it in the next several years.[15] Hence, the labor force is expected to continue to expand significantly, even though the rate of growth in Ph.D. production appears to be slowing down.

The market situation for persons with training in the clinical sciences appears to be subject to a different set

of factors. As discussed in Chapter 3, there has been an apparent decline over the period 1968 to 1973 in the number of M.D.'s engaged in research and teaching activities. In contrast, the number of clinical faculty positions in medical schools has been increasing substantially and is expected to continue to increase at a rate of between 5 and 8 percent per year up to 1980. Thus the Committee does not foresee an oversupply situation developing in the clinical sciences.

Despite the difficulties encountered in attempting to identify the population of health services researchers, the Committee believes that additional training support is warranted because of the increasing need for and emphasis on research in this area.

THE FEDERAL ROLE AND TRAINING QUALITY

One of the original intents of federal support of research training was to augment the supply of researchers to meet the then-growing demand. Based on the Committee's analysis of current and anticipated market demand, it believes that current personnel needs generally have been met in many biomedical and behavioral fields, although particular areas of shortage exist and will continue to arise. It should be remembered, however, that an increase in the number of researchers was only one goal of federal training support. Another was to bolster the quality of training programs and to ensure that training was available in areas of national interest.

The fundamental assumption linking the federal responsibility for research to a responsibility for training has been, and remains, that the quality of research depends primarily on the talents and training of the individuals attracted to a research career. The infusion of federal support has had not only a salutary impact on the needed supply of researchers, but has also led to a continued improvement in the overall standards of research training. Federal training grant/fellowship programs are now recognized as highly selective and conducive to quality training. In adjusting public policy to reflect changing market conditions, federal policy should seek to sustain and enhance this tradition of high-quality training.

The competitive process for awarding fellowship and training grant appointments assures the selection of the most talented and qualified applicants. This selection process acts as a quality-control device to set a high standard of excellence. In the fellowship program, students are selected individually through national competition; in the training grant program, quality is maintained by the peer review process of competing programs. Each of these

support mechanisms is discussed in further detail in the following paragraphs and in Chapter 2.

The fellowship program follows a long tradition in this country of awards based upon individual ability and initiative as shown by past academic performance and personal characteristics. The training grant, through its institutional support, is designed to provide stability and to permit flexibility and innovation in research training--three factors that encourage continuity of excellence in an academic field.

Both fellowships and training grants make available a high degree of flexibility in choosing programs. The fellow may personally seek admission to different programs and departments at various institutions. The trainee is afforded great flexibility in choosing a course of study within his program because he is not bound to a specific project.

Training grants represent up to a 5-year commitment to support a broad range of training-related activities designed to establish and maintain an environment conducive to research excellence. As an independent source of funds that goes beyond the existing financial constraints of institutions and departments, training grants provide incentives for program innovation through start-up and ongoing support that can initiate inter- and multidisciplinary programs, overcome the inertia of the current academic disciplinary structure, and provide legitimacy for new discipline- or problem-oriented approaches. Thus, while fellowships and traineeships encourage talented students to pursue careers in research, training grants additionally enhance the ability of departments to prepare them for truly productive careers.

It should be noted as well that the training grant program has enabled many departments to be strengthened that otherwise might not have been. Institutions that may not have had uniformly strong programs have been able to develop strength and excellence within individual departments. In so doing, they often have strengthened related departments that have benefited from the training program and its ability to draw in related disciplines.

The peer review process, conducted through the funding agencies, tends to winnow out the less strong programs during competition for renewal. As the number of training grant awards has been curtailed in recent years due to budget constraints, the quality of remaining programs has constantly been heightened through the peer review system.

The Committee believes that the federal responsibility for health research training goes beyond the simple assurance of access to graduate and postdoctoral training, and extends to the provision of programs that are of a high level of excellence in areas relevant to the national interest. Such responsibility may include not only particular research problems but also the development of

whole new areas of research need. Innovation in programs must continually be encouraged. Financial constraints placed on departments and institutions militate against their taking the initiative or being able to follow through on new ideas. The federal government's support is critical to such innovation and must therefore include, as much as possible, provision for program support as well as trainee support.

RECOMMENDATIONS

In this year's report the Committee is making a number of recommendations for adjustments in the number of predoctoral and postdoctoral awards for research training in each of the four broad fields--basic biomedical sciences, behavioral sciences, clinical sciences, and health services research--with respect to fiscal years 1976, 1977, and 1978. Because of the differences among these four fields, recommendations with respect to each are discussed separately. These four recommendations are based on the Committee's review of existing data and on best judgment, and are designed to: (a) reflect the overall needs with regard to number of individuals to be supported; (b) establish the directions for pre- and postdoctoral support through FY 1978 given the perceived needs within each broad field; and (c) provide the appropriate distribution of training grants and fellowships at each level of research training. A fifth recommendation concerns the separation of fields appropriate for training grant awards from those appropriate for fellowships as announced by NIH.

In developing these recommendations, the Committee has worked with its advisory panels, who provided advice with respect to the needs in their own areas of expertise, and who proposed program adjustments in response to the current manpower requirements in the biomedical and behavioral sciences. Not unexpectedly, the resultant recommendations of the Committee differ somewhat from one field to another. In all of its deliberations, the Committee has striven to make those decisions and recommendations that would further the goal of excellence of the individual researcher, the research training programs, and ultimately of the research enterprise.

The Committee recognizes that its recommendations with respect to FY 1976 can constitute only target goals, as much of this fiscal year has already passed. Unless otherwise noted, its principal specific recommendations relate to FY 1977. Tentative goals for FY 1978 are also included, with the understanding that these will be reviewed in the coming year and that final specific recommendations will be made in next year's report.

RECOMMENDATION 1: BASIC BIOMEDICAL SCIENCES

Currently available information on the projected employment market for research personnel in the biomedical sciences indicates the advisability of a modest but significant reduction of about 10 percent in the number of federally funded predoctoral candidates in that field from the level that existed in FY 1975. This reduction should be undertaken in FY 1976. Although this reduced level is shown in Table 1.1 and Figure 1.1 as being maintained through FY 1978, the Committee, during the coming year, will be studying in greater detail the effects of the recommended decrease in funding in order to determine whether an increase, a further decrease, or maintenance at that level is warranted. The Committee's Panel on Basic Biomedical Sciences intends to devise a feedback mechanism to assist in this monitoring effort.

The Committee also recommends that the number of federally funded postdoctorals in FY 1975 in the basic biomedical sciences should be continued at this time without change. It is at this level of study that the most able investigators in the basic biomedical sciences receive their specialized training.

For predoctoral candidates, the Committee concludes that funding by the training grant mechanism represents the most appropriate form of federal research training support. In contrast, for postdoctoral students, the recommendation is that the majority should be funded through the fellowship program. This mechanism not only assures that high-quality candidates are selected through the national peer review process, but that rapid adjustments can be made in response to research opportunities in various areas. In addition, the fellowship mechanism makes it possible for high-quality individual training to be obtained in the selected field at the institution of the fellow's choice.

RECOMMENDATION 2: BEHAVIORAL SCIENCES

The Committee recognizes the need for continued federal support of training of the behavioral scientists who are conducting research relevant to the health needs of the country. Current trends in behavioral science research, however, suggest that a significant reorientation of emphasis in the federally supported research training effort is desirable at this time. Scientific advances in these fields have vastly increased the complexity of research methods and imposed requirements for more intensive training. While the number of Ph.D.-level individuals currently being trained in the behavioral sciences appears to meet market demands in the conventional disciplines, there is a growing need for more specialized behavioral

science research training to deal with these increasingly complex research questions in the area of behavior and health. The Committee therefore recommends an orderly tapering down of predoctoral support with a concomitant emphasis on providing for research specialization through postdoctoral training, thus assuring the active application of advanced research training to meet the health needs of the country.

The Committee recommends that the current apportionment of about 10 percent postdoctorals and 90 percent predoctorals trained in the behavioral sciences through this program should be modified so that ultimately 70 percent of the individuals supported by NRSA funds are postdoctoral students and 30 percent are predoctoral students. In this way the Committee believes sufficient opportunity for training in the behavioral sciences at the postdoctoral level will be assured, while an adequate number of awards for basic research training at the predoctoral level also will be maintained. However, it is recommended that this change should be implemented gradually and at essentially a constant level of federal funding in FY 1976, FY 1977, and FY 1978, in order to minimize the dislocations that could otherwise occur for both programs and personnel. Because of the greater cost of postdoctoral training, this shift will mean significant reduction in the number of behavioral science investigators trained with federal funds during the 3-year period; however, the change is expected to enhance the quality of both the programs and the trainees.

In keeping with the above, the Committee recommends that the level of predoctoral candidates funded in FY 1975 be reduced by 250 in FY 1976, 300 in FY 1977, and 350 in FY 1978, and that the number of postdoctorals simultaneously be increased by about 150-200 each year until the recommended ratio is achieved.[16] The Committee will monitor closely the results of this change and will discuss in future reports whether modification of this recommendation is warranted.

Concerning the use of training grants and fellowships, the Committee concludes that for both predoctoral and postdoctoral students federal funding should remain at approximately the current ratio of traineeships to fellowships (82 percent training grants and 18 percent fellowships).

While the recommendation that postdoctoral training in the behavioral sciences should be conducted largely through training grants may appear inconsistent with the Committee's strong endorsement of the fellowship mechanism for postdoctoral training in basic biomedical research, different circumstances in the behavioral sciences call for a different approach. Whereas in the basic biomedical sciences postdoctoral training is well established and widely accepted, this is not so in the behavioral sciences, where postdoctoral training is just beginning to emerge. As a result, the full array of training alternatives must be

expanded, especially in the area of health and behavior. Furthermore, in view of the growing need for interdisciplinary training, the Committee believes that the formation of postdoctoral training programs by the faculties of training institutions will offer the necessary organization of innovative research training experiences for postdoctoral behavioral scientists at this time.

RECOMMENDATION 3: CLINICAL SCIENCES

The Committee concludes that the continued need for research-trained clinicians to investigate the applicability of new biomedical knowledge to disease problems in man justifies some emphasis on post-M.D. research training in the immediate future. Although virtually all of the researchers in the clinical sciences are M.D.'s, similar principles for training needs also apply to the smaller group of other professional doctorate holders, such as dentists and veterinarians, and Ph.D.'s working in the clinical sciences.

The Committee recommends that 2,800 trainees and fellows at the postdoctoral level be funded by the end of FY 1977, and that this level be maintained during FY 1978. The Committee will continue to monitor this recommendation to determine future directions as further information is developed. This recommended level for FY 1977 represents a one-third decrease from the peak level of postdoctorals funded in FY 1969 (about 4,200), when clinical specialty traineeships and some clinical residencies were also being funded, but a 10 percent increase over the number funded by the NIH in FY 1975 (about 2,550).

The physician, although trained for clinical practice, has usually not had the same formal training in scientific research as a person who has earned the Ph.D. degree. There is a need for high-quality programs specifically designed to provide the rigorous scientific background necessary to produce a clinician with the skills necessary to be a productive research scientist. The Committee therefore concludes that most of the federal funding in this field should be in the form of training grants. A ratio of about 80 percent in traineeships and 20 percent in fellowships is considered appropriate.

The Committee took special note of the NIH-sponsored Medical Scientist Training Program, which supports graduate level training in medically relevant scientific fields, leading usually to the award of both the M.D. and Ph.D. degrees. It recommends that approximately 600 trainee positions be funded in FY 1977, an increase from the 581 positions authorized in FY 1976 and the approximately 550 trainees supported in FY 1975.

RECOMMENDATION 4: HEALTH SERVICES RESEARCH

The Committee concludes that health services research represents an emerging area of national importance, in view of the ever-increasing amount of public and private funds expended in health services.

In NIH and ADAMHA, the only formally designated program in this area is the mental health services research and evaluation program supported by ADAMHA. In addition, both agencies provide training in a number of basic biomedical and behavioral sciences disciplines, such as epidemiology, sociology, and biostatistics, whose methods are appropriate to health services research. The Committee concludes that present funding of predoctoral and postdoctoral students in these disciplines should be continued at the existing level as a feeder mechanism for later more focused training in the health services research field. These programs will be assessed to determine whether current levels are sufficient to meet projected needs. The Committee also recommends that both predoctoral and postdoctoral training in this area should be undertaken largely through training grants rather than through fellowships.

Although funding by the Health Resources Administration (HRA) of the Public Health Service is not the primary focus of the legislative mandate of this Committee, consideration of existing and emerging policies of HRA with respect to health services research has a direct bearing on the recommendations and therefore must also be discussed. Since 1968, the National Center for Health Services Research, which now is part of HRA, has formally designated and funded a variety of both predoctoral and postdoctoral research training programs in health services research. In spite of the major national importance of this field, HRA has indicated that it is required to discontinue all new starts and is able to continue to fund only those trainees who are already receiving support, with the result that the program will be eliminated in the near future. Other than the training provided by ADAMHA for mental health services research and evaluation, NIH and ADAMHA presently provide no direct training in health services research. Thus federal funding of research training specifically directed toward this field will remain limited unless either HRA is permitted to reverse its current position, or NIH and ADAMHA begin to expand their efforts in scope and in numbers.

The Committee strongly urges that HRA continue to serve as the locus for health services research training, inasmuch as its programs train personnel for research directed toward improved organization of health care (see Appendix II, Table II.11). Further, in order to meet the anticipated manpower needs, the Committee recommends that the emphasis in the field of health services research should be shifted from predoctoral to postdoctoral research training since it is at the postdoctoral level that trainees can learn to bring

sound basic research training to bear upon the special problems of improving the provisions of health care. Thirdly, training should be provided primarily through the training grant mechanism, except in those instances where the research fellowship is more appropriate to the need for acquiring specialized skills.

If HRA is unable to continue its former role, it is important that NIH and ADAMHA develop and expand their own formally designated programs for funding research training in the health services field.

NUMERICAL RECOMMENDATIONS

The numbers of traineeship and fellowship awards made by NIH and ADAMHA in FY 1975 for support of training in each aggregate field are shown in Table 1.1 and Figure 1.1, together with the Committee's recommendations for FY 1976 through FY 1978. The funds estimated to be required by the recommendations, using the assumptions noted in the footnotes, are given in Table 1.2. Table II.1 in Appendix II contains additional data relevant to Tables 1.1 and 1.2.

The Committee strongly believes that periodic adjustments in the magnitude, directions, and types of research training programs, including specific changes recommended in this report, should be taken in gradual steps rather than by precipitous action that would produce dramatic disruptions. Prediction of future personnel requirements in any research area is uncertain, and major program changes should not be undertaken until their possible consequences have been carefully studied. Furthermore, any alterations in federal funding will inevitably have an impact on numerous training programs in privately and publicly supported institutions that have been receiving federal support over the years and on individuals whose livelihoods are intimately connected with these programs. Changes should therefore be instituted with adequate advance notice, so that severe adverse consequences can be minimized.

RECOMMENDATION 5: ANNOUNCEMENT AREAS

The Committee has reviewed the preliminary announcements issued by NIH on October 24, 1975, and by ADAMHA on October 10, 1975, for this year's NRSA program. (See Appendix VII for announcements.) The Committee questions the validity of the distinction drawn by the NIH in its announcements between areas that are appropriate for training grants and areas that are appropriate for fellowships, since no

TABLE 1.1 Committee Recommendations for NIH and ADAMHA Predoctoral[a] and Postdoctoral[b] Traineeship and Fellowship Awards from FY 1977 Funds, Target Goals for FY 1976 and Tentative Goals[c] for FY 1978 by Aggregate Field

Aggregate Field[d]	Actual Traineeship and Fellowship Awards, FY 1975			Committee Recommendations: Traineeship and Fellowship Awards								
				Target Goals for FY 1976			Recommended for FY 1977			Tentative Goals for FY 1978[c]		
	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
Biomedical Sciences	9199	6003	3196	8600	5400	3200	8600	5400	3200	8600	5400	3200
Behavioral Sciences	1966	1754	212	1860	1500[e]	360	1740	1200	540	1590	850	740
Clinical Sciences[f]	3095	543	2552	3256	581	2675	3400	600	2800	3400	600	2800
Health Services Research[g]	183	132	51	185	135	50	185	135	50	185	135	50
TOTAL	14443	8432	6011	13901	7616	6285	13925	7335	6590	13775	6985	6790

[a]Includes pre-Ph.D. and some pre-M.D.'s who are engaged in full-time research training for a minimum of 8 months in the calendar year.

[b]Post-Ph.D. and postprofessional (e.g., post M.D.).

[c]To be specified in the 1977 annual report of the Committee.

[d]See the glossary for description and listing of training fields included within each aggregate field.

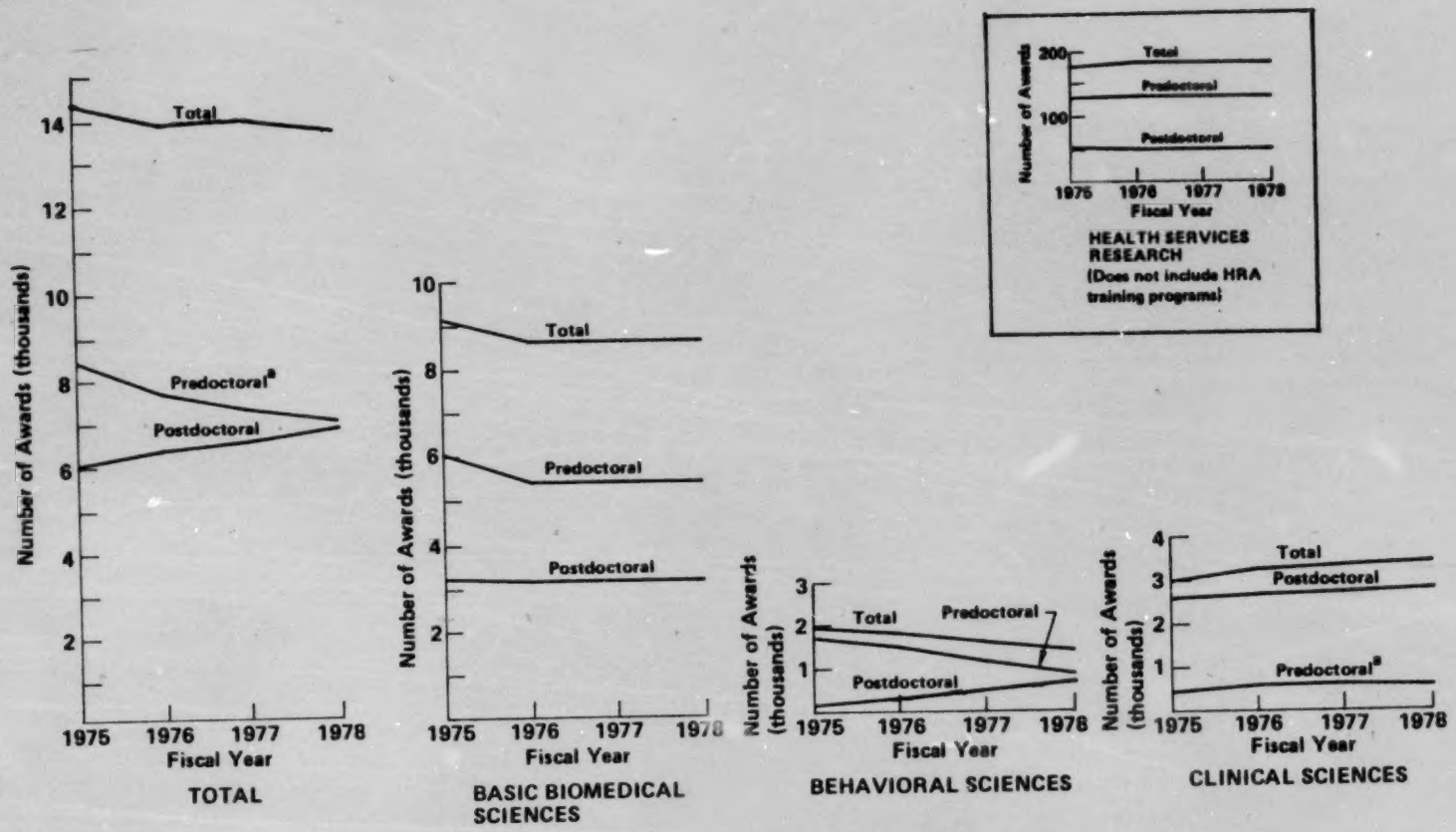
[e]See footnote 16 in Chapter 1, p. 22.

[f]Predoctoral training in the Clinical Sciences refers only to the Medical Scientist Training Program. The recommended level of 581 awards for FY 1976 represents the number authorized by the NIH.

[g]The training fields that comprise this aggregate field provide research training also to personnel properly classified in each of the other aggregate fields, but at levels that are as yet undetermined. Thus the entries for Health Services represent maximum figures for ADAMHA and NIH. See Appendix II, Table II.11, for a summary of support from HRA for health services research.

NOTE: Training grant awards are made at the end of a fiscal year and support trainees on duty in the subsequent fiscal year. Fellowship awards are made throughout the fiscal year, and in this report it is assumed that the fellowship awardee starts his training in the fiscal year of the award.

SOURCE: The data for FY 1975 were derived from tabulations supplied by NIH and ADAMHA, January 9, 1976 (see Appendix IV, Table IV.17).



NOTE: Training grant awards are made at the end of a fiscal year and support trainees on duty in the subsequent fiscal year. Fellowship awards are made throughout the fiscal year in which the training occurs and in this report it is assumed that the fellowship awardee starts his training in the fiscal year of the award.

SOURCE: Table 1.1

[a]Predoctoral training in the clinical sciences refers to the Medical Scientist Training Program leading to the combined M.D./Ph.D. degree.

FIGURE 1.1 Summary of Committee Recommendations for NIH and ADAMHA Research Training Awards

TABLE 1.2 Estimated Cost of Recommended Programs for FY 1976-78, NIH and ADAMHA

(millions of dollars)

Aggregate Field	Actual Cost for FY 1975 ($ millions)			Estimated Cost of Recommended Program								
				Target Goals for FY 1976 ($ millions)			Recommendations for FY 1977 ($ millions)			Tentative Goals for FY 1978 ($ millions)		
	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
Biomedical Sciences	95.6	51.7	43.9	91.6	46.1	45.5	91.6	46.1	45.5	91.6	46.1	45.5
Behavioral Sciences	18.1	15.1	3.0	18.1	13.0	5.1	18.1	10.4	7.7	18.1	7.4	10.7
Clinical Sciences	55.8	4.1	51.7	55.9	4.9	51.0	55.5	5.1	50.4	55.5	5.1	50.4
Health Services Research	2.0	1.3	0.7	1.9	1.2	0.7	1.9	1.2	0.7	1.9	1.2	0.7
TOTAL	171.5	72.2	99.3	167.5	65.2	102.3	167.1	62.8	104.3	167.1	59.8	107.3

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.

ASSUMPTIONS:

1. The total awardees are distributed among training grants and fellowships approximately as shown in Appendix Table II.1.

2. These average costs were derived from data supplied by the institutes of NIH and ADAMHA.
   The average cost for a predoctoral trainee is $8,500, including indirect expense at 7 percent.
   The average cost for a postdoctoral trainee is $14,500 (except in the clinical sciences as explained below), including indirect expense at 7 percent.
   The average cost for a predoctoral fellow is $10,000, including $3,000 institutional allowance.
   The average cost for a postdoctoral fellow is $14,000, (except in the clinical sciences as explained below), including $3,000 institutional allowance.
   In the clinical sciences, the average cost in FY 1975 for a postdoctoral trainee was about $20,000. This was higher than in other fields for the following reasons:

   (a) Prior to enactment of the NRSA Act of 1974, considerable flexibility was given to the training grant directors in setting stipend levels. Thus, higher than normal stipends were often paid to post-M.D.'s, many of whom had finished their residency and were older and more experienced than other trainees;

   (b) The costs of the staff and faculty were also generally higher on clinical science training grants.

   Under the NRSA Act, stipends will adhere more strictly to established levels and hence, the average cost per post-M.D. trainee in the clinical sciences is expected to decrease to about $19,000 in FY 1977. For post-M.D. fellows, the average cost is expected to decrease from $16,000 in FY 1975 and FY 1976 to $15,000 in FY 1977. These decreases account for the decline in the estimated cost of the clinical sciences training programs despite the increasing number of trainees.

3. For FY 1975, the total cost of $171.5 million was taken from data supplied by NIH and ADAMHA. The total for predoctoral was estimated by applying average cost figures to the estimated number of predoctoral awards. The total for postdoctorals was obtained by subtraction.

4. The cost estimates above make no attempt to estimate possible future increases in stipend and allowance levels due to inflation.

criteria for inclusion or exclusion of specific areas for funding have been stated by the NIH. The Committee recommends that this practice be discontinued.

The Committee is also concerned that there may be additional areas that are not listed that may also be appropriate for federal funding. Moreover, the Committee notes that some other basic research areas, such as immunology and biostatistics, are listed for funding by specific categorical institutes but not by the National Institute of General Medical Sciences.

The Committee is of the opinion that NRSA fellowships and training grants should be awarded solely on the basis of quality within program categories deemed relevant to the national interest. At the present there is no basis for determining under Section 472(a)(3) of the Act that any particular subject area is not appropriate for such funding. Although, as is pointed out in the last section of this chapter, the Committee is unable at this time to specify scientific areas or subjects for special emphasis, it nonetheless wishes to state clearly that its recommended reductions in certain broad fields should not be achieved by exclusion or limitation of specific subject areas. The Committee will be meeting with NIH and ADAMHA personnel to consider these matters further in the coming year and will discuss them fully in its next report.

THE TASK OF IDENTIFYING PRIORITY TRAINING AREAS

The Committee has carefully considered the broader congressional mandate to identify areas in biomedical and behavioral research that justify special emphasis for research training, either because they are emerging areas of significant promise, or because they represent important national needs not adequately emphasized at this time. The Committee recognizes the importance of the role played by informed expert opinion in carrying out this legislative charge. This task cannot be and has not been taken lightly. In the past year, the Committee has proceeded to consider this matter with each of its four disciplinary advisory panels. The Committee, together with these advisory panels, has determined that existing analytic methods are insufficient and that more satisfactory ones must be developed during the coming year before sound recommendations can be assured (see Chapter 4).

Within the framework of this study the Committee has reviewed data that describe the composition of, and mobility within, the biomedical and behavioral research fields. However, the difficulties of interpretation suggest that great caution be exercised in the translation of such information into formal recommendations for federal action. For example, it has been noted that significant portions of

the trained research population have been found to be employed in areas outside of their fields of training. However, it is not possible at this time to determine to what extent these reflect changes in market conditions or are indicative simply of the versatility of the individuals' training. Until the factors underlying field mobility are investigated in greater detail and other related factors are explored, the Committee has concluded that specification of priority areas for research training would be not only incomplete and speculative, but also possibly misleading at this time.

Despite the absence of such subfield recommendations in the present report, the Committee has given some consideration to the appropriateness of such specifications with respect to the distribution of research training support within each aggregate field. For example, the Committee notes that research personnel from the fields of biomathematics and biostatistics are utilized in and contribute to each of the four broad fields. Some comments with regard to subfield concerns follow.

Basic Biomedical Sciences

The continuing availability of an adequate number of investigators from existing training programs, the broad base of the training they have received, and the close relationship among many basic biomedical disciplines have led to a substantial degree of mobility between different disciplines.

The implication of these findings with respect to designation of specialty areas for research training for predoctoral support is that important areas of research can be adequately staffed by personnel emerging under the existing types of training programs. This has led the Committee to conclude that designation of specialty areas is not warranted at this time. With regard to postdoctoral research training, the Committee will study this matter in the coming year to determine if specific areas can be identified for special consideration.

Behavioral Sciences

The Committee recognizes that important changes in research training needs are now taking place as behavioral scientists encounter more complex and interdisciplinary problems in the biomedical research laboratory and other health-related areas. The Committee believes that further information is required to discern the impact of such shifts upon the training requirements for specific subspecialty areas within the behavioral sciences. Accordingly, the Committee is recommending greater emphasis on postdoctoral training by

which trainees who have already mastered the basic behavioral disciplines can acquire the specialized training they will need to work fruitfully on health-related research problems.

Until the shape of research training needs in the behavioral sciences field becomes clearer, the Committee refrains from identifying specific subfields for special emphasis. The Committee will carefully study the views with respect to research training needs that are reflected in the professional judgments of members of the behavioral sciences research community as they propose and formulate postdoctoral training programs. Sufficient reliance can be placed in this mechanism for the immediate future; the Committee and its Behavioral Sciences Panel will keep the matter under continuing scrutiny.

Clinical Sciences

The Committee recognizes that important clinical advances often depend upon research in biomedical or physical sciences not originally directed toward the diagnosis, treatment, or prevention of specific diseases. Nevertheless, full application of basic knowledge to the solution of clinical problems often requires that additional personnel be trained for research in particular clinical fields after they have received their professional degree. The Committee is aware of some areas of research training that have been suggested by leaders in this field as justifying special consideration, but has concluded that the data presently available are insufficient to permit a firm conclusion on this matter at this time. The Committee will review these and other suggestions for special consideration in subsequent reports. In the interim, as the basic guiding principle, it recommends that primary emphasis be given to training for research on the etiology and pathogenetic mechanisms of disease; it is in this way that the greatest progress will be made in the ultimate prevention and treatment of diseases.

Health Services Research

Because the entire spectrum of disciplines comprising health services research requires substantial enhancement through research training, the Committee concludes that it is inappropriate to single out areas suitable for priority treatment. The Committee believes it will be necessary to increase the nation's overall investment in this field before specific areas of particular need can be targeted.

To summarize, the Committee emphasizes that there is a need for highly qualified research personnel to be trained in all four of the broad fields into which it has divided biomedical and behavioral research, and that there is a similar need in each specialty subject area within those four fields.

Finally, the Committee notes the extensive work of the President's Biomedical Research Panel in reviewing the present course of biomedical research in the nation and making recommendations for the future. The Committee will carefully review the final report of this panel, and the public reaction to it, to determine whether additional areas of research should be designated for special emphasis with regard to appropriate levels for research training.

FOOTNOTES

1. National Board on Graduate Education, Federal Policy Alternatives toward Graduate Education, Washington, D.C., National Academy of Sciences, January 1974.

2. See Appendix V for relevant sections of the National Research Service Award Act of 1974.

3. National Research Council, Commission on Human Resources, Personnel Needs and Training for Biomedical and Behavioral Research. The 1975 Report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel, Washington, D.C., National Academy of Sciences, 1975.

4. National Research Council, Commission on Human Resources, Research Training and Career Patterns of Bioscientists: The Training Programs of the National Institutes of Health. Report of the Committee on a Study of the Impact of the National Institutes of Health Research Training Program on the Career Patterns of Bioscientists, Washington, D.C., National Academy of Sciences, 1975.

5. The Committee's interpretation of "need" in the context of this study is based on the concept of personnel requirements expected to exist at prevailing wage levels. Another possible interpretation is discussed in Chapter 2, p. 33.

6. National Science Foundation, Projections of Science and Engineering Doctorate Supply and Utilization 1980 and 1985, Washington, D.C., U.S. Government Printing Office, 1975.

7. U.S. Department of Labor, Bureau of Labor Statistics, Ph.D. Manpower: Employment Demand and Supply 1972-85, Bulletin 1860, Washington, D.C., U.S. Government Printing Office, 1975.

8. National Research Council, Survey of Earned Doctorates, 1957-74 (annual); National Research Council, Survey of Doctoral Scientists and Engineers, 1973; and National Science Foundation, National Register of Scientific and Technical Personnel, 1960-70 (biennial).

9. Journal of the American Medical Association, Education Number, annually, in November, 1960-74; and Medical Schools Faculty Roster, Washington, D.C., Association of American Medical Colleges.

10. National Science Foundation, Expenditures for Scientific and Engineering Activities at Universities and Colleges, FY 1974, Washington, D.C., U.S. Government Printing Office, 1975.

11. U.S. Department of Health, Education, and Welfare, Office of Education, Students Enrolled for Advanced Degrees, Washington, D.C., U.S. Government Printing Office, 1960-73 (annual).

12. National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1972-74.

13. Ibid., 1974.

14. National Research Council, Survey of Earned Doctorates, 1957-74 (annual).

15. A. M. Cartter, ed., Assuring Academic Progress Without Growth, New Directions Series, San Francisco, Jossey-Bass, 1975.

16. The recommendations for FY 1976 are intended to be target goals rather than imposed ceilings. It is understood that because of timing considerations, the implementation of these recommendations may pose problems in FY 1976. For example, the Committee is aware that ADAMHA's commitments for predoctoral support in the behavioral sciences in FY 1976 exceed their awards in FY 1975. In honoring such commitments, the agencies may not be able to adhere strictly to the Committee's FY 1976 recommended levels. Therefore, FY 1976 recommendations are presented here as indicators of the desired emphasis and direction of program alterations rather than absolute numerical limitations.

2. RESEARCH TRAINING IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES--A NATIONAL OVERVIEW

Research training in the health-related sciences is accomplished in the United States through a large and complex array of programs. This chapter will outline the nature, purpose, and diversity of these programs. It will review the system of student support and discuss briefly the problem of determining the supply and demand for biomedical and behavioral research personnel.

THE RESEARCH TRAINING SYSTEM

Formal research training is essentially a postbaccalaureate activity in the United States. The settings in which training occurs include university graduate schools; schools of medicine, dentistry, veterinary science, public health, and engineering; and associated laboratories, hospitals, mental health clinics, counseling centers, social agencies, and other field areas.

Levels of Training

In terms of their level, training programs may be divided into two broad classes -- predoctoral and postdoctoral. Predoctoral programs are aimed principally at individuals who are seeking a research doctorate defined as the Ph.D. or equivalent. Postdoctoral training is provided for individuals who hold either a research doctorate or a professional doctorate such as M.D., D.D.S., or D.V.M.

Predoctoral. Predoctoral training is generally carried on within the context of a specific scientific discipline, such as anatomy, biochemistry, microbiology, physiological psychology, ethology, psychopharmacology, or anthropology. The functional unit of predoctoral training is the disciplinary department or, in some instances, a structured multidisciplinary program.

The predoctoral student characteristically progresses through a series of didactic and laboratory courses; learns to communicate in small seminar groups; and, through continuing interaction with peers, postdoctoral fellows, the

faculty, and visiting lecturers, gradually acquires the traditions, values, style, and research methodology of the particular discipline. This experience may be brought into sharper focus through experience as a teaching assistant in an undergraduate course under the supervision of an experienced faculty member and in the pursuit of an original research project. Although such a project may be a wholly independent endeavor, it is common practice in the biomedical sciences for the graduate student to conduct one phase of a large research program in the faculty mentor's laboratory, where he or she works as a member of a research group, utilizing all the research facilities in the laboratory and conferring frequently with mentor and colleagues. The predoctoral student in the behavioral sciences less often derives a dissertation topic from the large research project of the mentor, but this depends on the particular subfield of behavioral study. Laboratory-based studies of behavior resemble the biomedical tradition. More commonly, the dissertation is undertaken very much on the student's own responsibility after a period of limited apprenticeship, usually as a research assistant, in connection with one or more research projects that are organized and executed by a senior member of the faculty. In all cases, somewhat more of the research methodology is learned didactically rather than on the job, although this again varies across the spectrum of the behavioral science subfields.

Less formal predoctoral research training programs are available to individuals who are pursuing a professional doctorate and are taking time out for research training. These individuals are for the most part undergraduate students in the health professions schools, who, having shown interest in the biologic phenomena underlying disease, have been encouraged to develop their research potential. For medical students, this research activity may be carried on part-time and concurrently with their regular studies, or full-time during an "off" quarter or during a year's release from medical training.

Predoctoral training in the basic biomedical and behavioral sciences generally requires 4 to 7 years of full-time work and study between receipt of the bachelor's degree and attainment of the Ph.D. degree. Approximately two-thirds of Ph.D. recipients in the biomedical and behavioral sciences were engaged in academic employment in 1973. The remainder in the biomedical pool were evenly divided among industry, the federal government, and other sectors. The nonacademically employed behavioral scientists worked in hospitals, clinics, social welfare agencies, or were self-employed.

Postdoctoral. The value of postdoctoral training, both at the post-Ph.D. and postprofessional levels, has perhaps been most widely recognized in the biomedical sciences. In addition, postdoctoral training has become

almost a requirement for the physician wishing to pursue a career in academic medicine. The opportunity for M.D. and Ph.D. graduates to be trained together during the postdoctoral period is widely regarded as a valuable aspect of this experience. Further, postdoctoral education is regarded as important for training graduates from the physical sciences who wish to utilize their special knowledge and capabilities for biomedical and behavioral research.

Post-Ph.D. training is oriented toward specialized experience in a research topic rather than a discipline. Each year an increasing proportion of those who receive the Ph.D. degree have been going on to postdoctoral training to sharpen their research skills under outstanding mentors. In biochemistry, for example, the percentage of Ph.D. recipients taking immediate postdoctoral appointments rose from 36.2 to 58.1 over the period 1962-67.[1] A large percentage of these Ph.D. holders seek such experience in settings other than those of their graduate school mentors in order to gain new perspectives and to respond to new opportunities, particularly in interdisciplinary and emerging research areas.[2] In 1973, the number of biomedical and behavioral science post-Ph.D.'s in the United States totaled almost 6,000.[3]

Research training for individuals holding a professional doctorate must take into account the difference between their educational background and that of the the post-Ph.D. Many college seniors with exceptionally fine academic records elect to enter medical school instead of Ph.D. programs. To the extent that the 4 years of medical school and subsequent years of residency training were designed to produce clinicians and not medical scientists, residents who then elect to become clinical scientists require further scientific training.

Since a proper mix of biomedical, behavioral, and clinical scientists is essential to initial discovery and full application to clinical problems, it has become necessary to develop new programs in schools of medicine to instill rigorous scientific discipline in the design of experiments, proper use of methods, and critical evaluation of data, as well as to provide a broad background in the physical and biological sciences. These programs are demanding on both the physician-trainee and the faculty, because of the trainee's need to acquire in 2 to 3 years an extraordinary amount of new scientific knowledge, a variety of skills, and actual research competence. A highly trained medical scientist today must have, in addition to clinical training, a grasp of the more basic areas, such as molecular structure and function of proteins and nucleic acids, the ultra-structure of various cell types that make up tissues and organs of the body, and the underlying behavior mechanisms of the whole body. Further, although some post-M.D.'s may do only clinical investigation, others will

engage in research on basic biomedical problems whose solutions are essential to clinical progress, and many will develop competence to do both clinical investigation and basic laboratory investigation. In 1973 the number of individuals with professional doctorates who were pursuing postdoctoral research training totaled more than 5,000.[4]

Interaction among Basic Biomedical, Behavioral, and Clinical Scientists

At the present time, there are two groups of scientists in biomedical research. The first consists of those with an intensive preparation in one of the physical, biological, basic medical, or behavioral sciences but with relatively little knowledge of clinical medicine. These scientists are essential to elucidate the fundamental processes that underlie living systems. Because of the difference in perspective and training, however, they do not pose the types of questions likely to be raised by a physician. Consequently, they do not often extend their basic research to the arena of clinical medicine. The second group is made up largely of physicians who have completed 1 or 2 years of research training following graduation from medical school. These clinical scientists are engaged in exploring the pathogenesis of disease and learning how to diagnose disease early and to prevent or treat it effectively.

Mechanisms have been developed to ensure that the remarkable advances in physical, biological, and behavioral sciences are used by clinical scientists in their search for a deeper understanding of disease. The NIH-sponsored Medical Scientist Program is a mechanism that combines in one program the essential features of both research and clinical training. Interdisciplinary training programs are another mechanism for developing a medical scientist capable of communicating and interacting with basic physical and biological scientists. Other methods include placing clinicians in basic science departments for their research training and providing experience on interdisciplinary research projects.

Sources of Trainee Support

The five principal sources of financial support for individuals engaged in research training are fellowships, training grants, research assistantships, teaching assistantships, and private means. Together these comprise a pluralistic system, including both private and public support and commonly embracing more than one source of support in a single institution. While more administratively cumbersome than a single source, the pluralistic system is believed to have provided greater

flexibility to the institutions and departments involved in the training.

Fellowships. These are awards made directly to the individual, largely in the form of a stipend, from a variety of sources, such as the federal government, voluntary health organizations, foundations, and universities. Fellowships have been used in support of training for many years as a means of encouraging excellence and reducing financial barriers to training. Except for local programs, the fellow may take the appointment at any host institution with appropriate facilities and where a suitable mentor is willing to supervise the training. Awards are made to both predoctorals and postdoctorals, selected in separate competitions. National fellowship programs permit utilization of a more uniform set of standards in the selection of fellows, and the awardee has wider latitude in the selection of a training site. The award, as in the case of NIH/ADAMHA fellowships, may include a modest institutional allowance to help defray costs of training the fellow such as tuition and fees, research supplies, equipment, travel to scientific meetings, and related items. That allowance differs, however, from funds included in training grants for the specific purpose of strengthening the scientific milieu of the department in which the training is pursued.

Training grants. These grants are awarded by the federal government to institutions for individual departments or a consortium of departments for training in a specific field. In addition to providing trainee stipends, these grants enhance the quality of training by providing funds to departments for salaries, special seminars, courses, supplies, and equipment. In contrast to departmental training grants, multidisciplinary grants make it easier for graduate students to anticipate emerging scientific fields and to select their dissertation topics accordingly, with access to appropriate faculty in related subject areas across departmental lines. Programs supported by these grants may be devoted exclusively to either predoctoral or postdoctoral training levels, or both. Individual trainees are selected by faculty participants on the basis of credentials and letters of recommendation similar to those in fellowship programs. The grants are awarded through national competition, with continuing peer review to ensure that training is conducted in departments of the highest quality.

Research assistantships. Many graduate students and postdoctorals receive support for work performed on research projects. Often this work fits their scientific interests and training requirements and hence serves as useful educational experience. In some cases, the student may conduct an original study, as part of the overall project, that is suitable for a dissertation and that contributes to the advance of research supported by the project grant. As

a major source of support for research training, however, this mechanism has some drawbacks. Training for research, particularly at the predoctoral level, requires more than on-the-job experience. When the student's support is tied to a research grant, there exists the possibility of a mismatch between educational objectives and the project director's primary interest in maximizing research output. In addition, competence in research by an individual project director does not necessarily parallel competence and interest in training. Experience with the research grant as a training instrument, in light of its advantages and risks, suggests the need for a flexible mixture of the research assistantship and other types of support for research training.

Teaching assistantships. Graduate students and postdoctorals may be supported by their institutions as teaching assistants because of their contributions to teaching programs. These teaching assignments are usually at the undergraduate level, and, hence, opportunities for this type of support tend to be available only in institutions and departments with large undergraduate teaching responsibilities. The teaching assistant typically grades papers, sets up experiments for laboratory sessions, holds classes in which lectures given by senior faculty members are discussed and in which texts and other written material relating to the course are reviewed, and guides students in laboratory work associated with undergraduate courses. These duties commonly occupy one-half of the teaching assistant's time, in return for which a modest stipend is provided and tuition fees are remitted. Valuable experience is acquired in the art of teaching, which for most Ph.D. holders is an essential part of their future jobs.

Private means. Many students, particularly at the predoctoral level, support their training through private resources, including family aid, private loans, part-time employment, and assistance from a working spouse. Excessive reliance on this type of support is undesirable, because many persons of superior potential cannot afford to undertake research training.

These different forms of support, properly administered, can be appropriately related to the various purposes and stages of the training process. For example, graduate students may be provided with fellowships or traineeships for the first 2 years, teaching assistantships for the third year, and research assistantships for the fourth and succeeding years until the dissertation is completed and the degree awarded. This pattern allows the student to prepare as rapidly as possible for teaching and research. Teaching is postponed until the student knows enough to be able to do it well, and the research assistantship is utilized at a time when the student is relatively free and well enough informed to make a sound choice of mentor whose research

program has an appropriate opening. Under its auspices and support, the student can conduct the research needed for the dissertation while contributing to the mentor's research program.

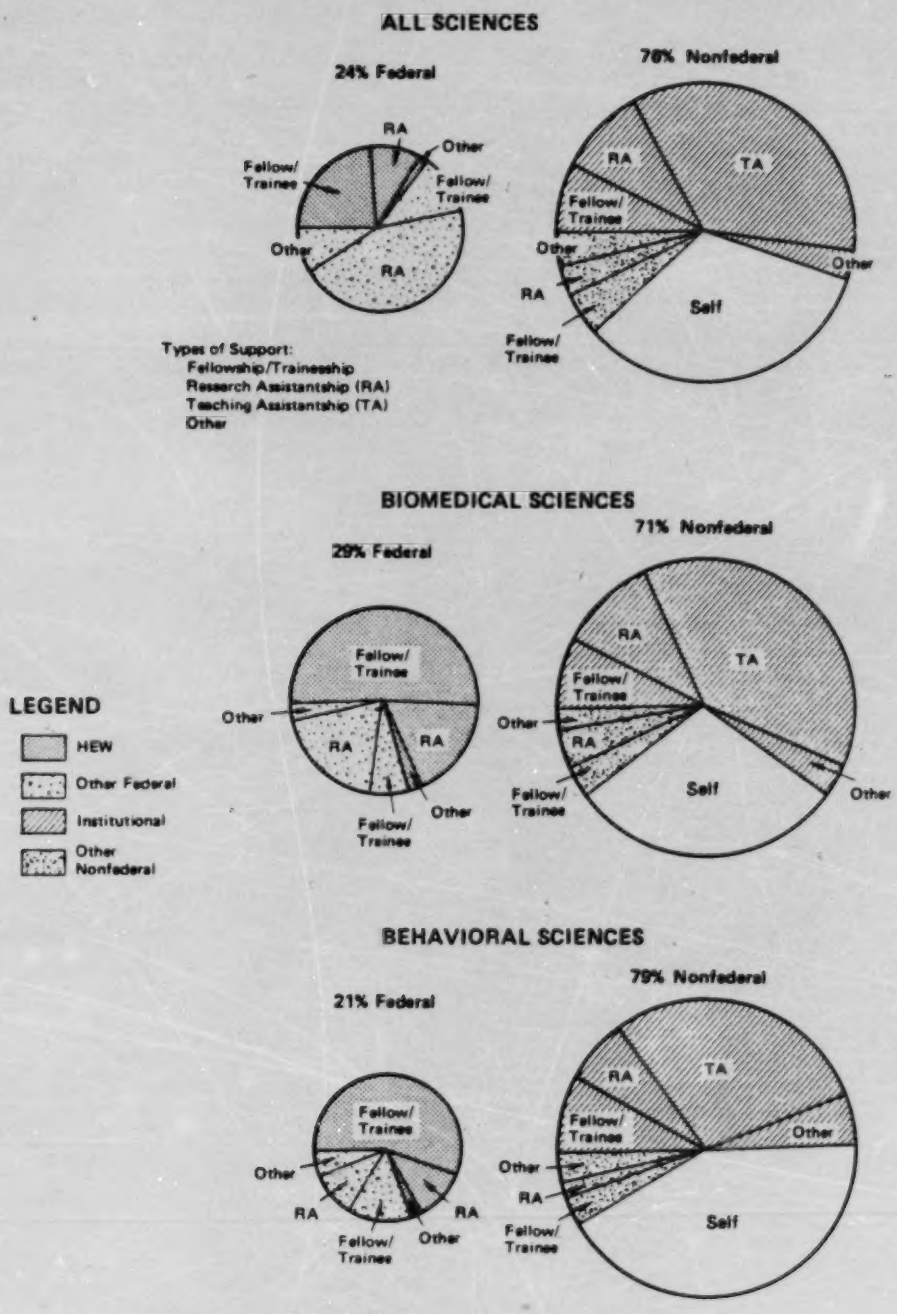
THE SYSTEM OF SUPPORT IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES

The role of federal support in research training can best be understood when placed in the context of the overall system of support in the biomedical and behavioral sciences. Considering the diverse loci of responsibility for supporting graduate education, it should not be surprising that the federal government supports only a relatively small fraction of all biomedical and behavioral science graduate students. In postdoctoral study, the national interest in targeted research and the absence of local university responsibility have meant that federal support here has assumed a larger overall responsibility. This section will first consider graduate and postdoctoral support in the biomedical and behavioral sciences and then discuss briefly support for clinical research training. Health services research, which is basically a multidisciplinary field fed by diverse behavioral, biomedical, and clinical fields, cannot be adequately defined quantitatively at this time and thus will be omitted from this discussion.

Graduate Student Support

The federal government in 1974 provided the primary source of support for 29.1 percent of full-time graduate students in the biomedical sciences and 20.9 percent of behavioral science students.
This compares to 23.7 percent of graduate students in all sciences (see Figure 2.1 and Appendix II, Table II.2). Other primary sources of support were institution/state sources and personal resources (including self, family, and spouse). In the biomedical sciences, institutional support comprises 42.8 percent and self-support 21.5 percent of primary sources of support. In the behavioral sciences, where federal funding is less prominent, a larger portion (34.0 percent) comes from self or family and 38.8 percent from institutional and state sources.

It is important to note that different systems of support utilize different mechanisms, depending on the objectives of the sponsor. Federal support for graduate students, which is intended primarily for research purposes, is made up of fellowships, traineeships, and research assistantships. In the biomedical and behavioral sciences, support by the U.S. Department of Health, Education, and



NOTE: See Tables II.2 and II.3 in Appendix II for supporting data.
SOURCE: National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1974

FIGURE 2.1 Primary Source and Type of Support for Full-time Graduate Students in the Biomedical and Behavioral Sciences, 1974

Welfare (DHEW), primarily through NIH and ADAMHA, is concentrated in fellowships and traineeships (over 70 percent), in contrast to research assistantships. In agencies other than DHEW federal support for research training in all sciences is provided primarily through research assistantships (see Figure 2.1 and Appendix II, Table II.3).

Institutional/state support is composed of a wide diversity of types of support. Fellowships/traineeships, as well as research assistantships, are utilized, but by far the largest mechanism is the teaching assistantship, which reflects the primary interest of the individual institution and state government. Self-support, as noted above, is a significant source of support comprised of one's own earnings, loans, and spouse and family support.

In recent years, federal support has dropped off for the biomedical and behavioral sciences and indeed for all sciences. Most recently, from 1972 to 1974, federal support has declined 17.1 percent in all sciences, 13.6 percent in the biomedical sciences, and 18.1 percent in the behavioral sciences (see Appendix II, Table II.2). The mechanism of federal support most sharply cut back is the fellowship/traineeship. NIH support here in the biomedical sciences declined 13.2 percent from 1972 to 1974 (see Table 2.1). Federally supported research assistantships, however, did rise to offset partially the severe fellow/trainee cutbacks.

Nonfederal sources rose considerably during this time, at rates far exceeding overall federal declines. In the biomedical sciences, institution/state support rose 17.0 percent and self-support rose 19.9 percent (see Table 2.1). These increases account for the recent rise in graduate enrollments in spite of federal cutbacks.[5] All types of institution/state support--fellowships/traineeships, research assistantships, and teaching assistantships--shared in the overall increase. Self-support also rose substantially during this period.

Postdoctoral Support

The biomedical sciences have a strong tradition in postdoctoral study as a necessary step in gaining the knowledge and skills needed to conduct biomedical research. Because of the highly specialized nature of the training and its direct relation to federal agency goals for solving health research problems, the federal government has assumed a major role in postdoctoral study in this area. The federal government provided approximately 75 percent of the primary sources of support for biomedical science postdoctorals in 1974. Of those federally supported, about 40 percent were fellows/trainees and 60 percent were

TABLE 2.1 Primary Source and Type of Support for Full-time Graduate Students in the Biomedical Sciences, 1972 and 1974

	Number		% Distribution		% Change
	1972	1974	1972	1974	1972- 1974
Total	25205	26663	100.0	100.0	5.8
Fell/Tr	7541	6692	29.9	25.1	-11.3
RA	4925	5435	19.5	20.4	10.4
TA	6600	7376	26.2	27.7	11.8
Other	6139	7160	24.4	26.9	16.6
Total Federal	8998	7770	35.7	29.1	-13.6
Fell/Tr	5830	4508	23.1	16.9	-22.7
RA	2671	2845	10.6	10.7	6.5
TA	108	119	.4	.4	10.2
Other	389	298	1.5	1.1	-23.4
NIH	5736	5244	22.8	19.7	-8.6
Fell/Tr	4317	3746	17.1	14.0	-13.2
RA	1264	1364	5.0	5.1	7.9
TA	75	49	.3	.2	-34.7
Other	80	85	.3	.3	6.3
Total Nonfederal	16207	18893	64.3	70.9	16.6
Fell/Tr	1711	2184	6.8	8.2	27.6
RA	2254	2590	8.9	9.7	14.9
TA	6492	7257	25.8	27.2	11.8
Other	5750	6862	22.8	25.7	19.3
Institution/state	9758	11414	38.7	42.8	17.0
Fell/Tr	1104	1522	4.4	5.7	37.9
RA	1754	2001	7.0	7.5	14.1
TA	6425	7237	25.7	27.1	12.6
Other	475	654	1.9	2.5	37.7
Self, loans, etc.	4785	5736	19.0	21.5	19.9

CODE: Fell/Tr = Fellowship/Traineeship; RA = Research Assistantship; TA = Teaching Assistantship; Other = Other Types of Support.

NOTE: Data include persons enrolled in only those departments which responded to all three (1972-74) surveys, and hence do not represent population figures.

SOURCE: National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1972-74.

research associates, i.e., employed on research grants or contracts.[6]

The behavioral sciences have not utilized postdoctoral support to the extent that the biomedical sciences have because their programs were designed primarily to add to the pool of basic researchers. For example, 40 percent of 1972 Ph.D.'s in the biomedical sciences entered into postdoctoral work, compared with 22 percent of behavioral science Ph.D.'s. Of those behavioral science Ph.D.'s who did enter postdoctoral work, approximately 50 percent were federally supported. NIH and ADAMHA data indicate that they supported 2,798 biomedical science postdoctorals in 1974 (2,600 of which were from NIH) and 278 behavioral science postdoctorals[7].

Clinical Sciences

Clinical science training is unique compared to biomedical and behavioral science training in three basic respects: (1) it deals primarily with M.D.'s and other professional degree recipients; (2) it is located almost exclusively at professional schools; and (3) it takes place almost entirely at the postprofessional level. Because medical schools are professional schools with no undergraduate departments and because professional students are generally trained as practitioners, there are virtually no teaching or research functions that professional students serve. Clinical research training is thus concentrated at the postprofessional level. Typically, over 95 percent of NIH fellowship/traineeship support in the clinical sciences has been made at the postdoctoral level.[8] According to a National Science Foundation survey, approximately 60 percent of clinical science postprofessionals in 1974 were federally supported, of which 75 percent were fellows/trainees and the remainder research associates.[9]

DETERMINING THE SUPPLY AND DEMAND (NEED) FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

The NRSA Act of 1974 calls for assessment of the need for personnel to perform research in the biomedical and behavioral fields. The term "need" can be given various interpretations, and the Committee has devoted considerable discussion to the appropriate definition for purposes of this study. In a general sense, there is a need to reduce the costs of the various illnesses that prevail in our society today. In a very broad sense then, need could be interpreted as the manpower requirements that would result from a policy of investment in biomedical research based on the social costs of disease. This is a fairly unconstrained

approach, since it would require that research expenditures be somehow tied to a social-cost figure without regard to budgetary limitations.

The Committee has adopted a somewhat more disciplined interpretation of the task set forth in the Act. In the Committee's view, need is interpreted as the manpower requirements dictated by market demand at the prevailing salary levels. In other words, the task is interpreted as one of determining the number of positions that are expected to be available in the next few years for biomedical and behavioral scientists assuming that no significant changes in their wage structure will occur. The number of available positions for these scientists in turn is believed to be governed by the likely future pattern of enrollments in higher education and biomedical and behavioral research expenditures. Most researchers perform some combination of research and teaching. The teaching component of demand is thus represented by enrollments in higher education, while the research component is represented by the amount of research funds available.

Enrollments are fairly predictable, since they depend on demographic patterns that can be estimated from known birth rates. For example, correct predictions of increased college enrollment rates some 20 years later were made at the time of the post-World War II baby boom.

Conversely, research funds are allocated annually and are subject to the normal variations associated with economic conditions and political processes, making them a less predictable component.

On the other side of the market picture is the expected supply of scientists available to perform biomedical and behavioral research. Demography also plays a role here, for while the short-run effect of increased enrollments is to increase the teaching component of demand, the long-run effect is to increase the supply of scientists. We thus view the market for research personnel in these fields as a dynamic system whose elements are continually changing in response to demographic and economic factors. Superimposed on the demographic cycles are the variations in research emphasis and funding that add to the difficulties of trying to assess the future supply and demand patterns. It seems clear at this point that the system has passed through a sustained period of rapid growth into one in which the growth is expected to be more moderate. The supply/demand balance in future years depends, in addition to the factors mentioned above, on students' reactions to perceived job opportunities for doctoral-level scientists. The Committee feels that continual monitoring of trends in enrollments, research expenditures, and job opportunities provided by this study can furnish timely information to guide both individual decisions and federal policy. A more detailed assessment of manpower needs is presented in the next chapter.

FOOTNOTES

1. National Research Council, The Invisible University: Postdoctoral Education in the United States, Washington, D.C., National Academy of Sciences, 1969.

2. National Research Council, Mobility of Ph.D.'s: Before and After the Doctorate, Washington, D.C., National Academy of Sciences, 1971.

3. National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

4. National Science Foundation, Graduate Science Education: Student Support and Postdoctorals, Fall 1973, Washington, D.C., U.S. Government Printing Office, 1974.

5. National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1972-74.

6. Ibid., 1974.

7. National Research Council, Commission on Human Resources, Personnel Needs and Training for Biomedical and Behavioral Research. The 1975 Report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel, Washington, D.C., National Academy of Sciences, 1975, p. 34.

8. Ibid.

9. National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1974.

3. ASSESSMENT OF MANPOWER NEEDS

The supply of qualified scientists available to satisfy the nation's needs for health-related research personnel is composed of academic doctorate-holders (Ph.D. or equivalent) and professional doctorate-holders (M.D., D.V.M., D.D.S., etc.), who, with specialized training, have acquired the skills required for productive research on health-related problems. Most of those with academic degrees are employed in basic biomedical or behavioral science departments of universities and are involved in some combination of research, teaching, and administration. Those researchers with professional degrees generally are on clinical science faculties in medical and other health profession schools and provide some patient care in addition to these other functions. Although there are exceptions to these characterizations, the factors affecting the market for Ph.D. scientists are somewhat different from those affecting the market for researchers with professional doctorates. For this and other reasons related to data collection procedures, these two markets will be examined separately in this chapter.[1] A third section of this chapter will be devoted to the market for health services researchers, which is influenced by a somewhat different set of factors.

MARKETS FOR BIOMEDICAL AND BEHAVIORAL PH.D. SCIENTISTS

The supply of and demand for Ph.D. (or equivalent) scientists have been projected using a variety of models. These models share many of the same inherent weaknesses.[2] The complex decisions made by employers and potential employees cannot be completely described by a simple model with a limited set of variables. Supply decisions are based, in part, on individual perceptions of future salary levels, occupational prestige, and other motivational factors that are difficult to quantify. Demand decisions are influenced, in part, by research funding levels, general economic conditions, and changing needs and priorities. Abrupt changes in the economy, national priorities, societal values, and other dynamic market elements have an important impact on both supply and demand. Furthermore, manpower projections not based on econometric models tend to be self-

defeating, because they fail to allow for the feedback mechanism by which supply and demand components adjust to projected imbalances in the market. Even econometric models, in their present stage of development, do not take into account mobility patterns among disciplines and occupational activities. Hence, it is not surprising that two recently completed studies[3] of the markets for Ph.D. scientists and engineers arrive at quite different findings. While both studies project an oversupply of persons with academic doctorates in the life sciences and social sciences (including psychology)[4] by 1985, their specific estimates of supply and demand differ substantially. These differences reflect the uncertainties involved in using recent trends in a few important factors to project future market conditions.

Nonetheless, despite their shortcomings, projections of the market prospects for Ph.D. scientists in the biomedical and behavioral fields are undoubtedly helpful in anticipating significant changes in the utilization patterns of these highly trained personnel. The Committee's preliminary findings from a comprehensive analysis[5] of factors affecting the supply of and demand for Ph.D. researchers in the biomedical and behavioral sciences indicate that the employment market for these personnel may indeed be declining, as the studies cited above suggest. For the purposes of this analysis, the biomedical sciences included all the life sciences except agricultural disciplines, and the behavioral sciences encompassed psychology, anthropology, sociology, ethology, and social statistics.

Although it was recognized that not all of the Ph.D. scientists working in the above disciplines were involved in health-related research, it was not possible from available employment data to isolate those working in areas that would appropriately be of interest to NIH and ADAMHA. In the case of the behavioral scientists, probably only a small fraction were employed in health-related research. However, because of the high degree of field switching among both the biomedical and behavioral disciplines, it has been assumed that the employment markets for all Ph.D. scientists in these two fields will not be substantially different from the markets for the subpopulations working on health-related research. Table 3.1 presents the most current (1973) data available on the populations and utilization patterns of the approximately 47,300 and 31,800 Ph.D. scientists working in biomedical and behavioral disciplines, respectively. Approximately two-thirds of both labor forces were employed in academia. The majority of these behavioral scientists considered teaching their primary activity,[6] while the biomedical scientists were equally divided between teaching and research activities. It should be noted that there was minimal unemployment in these labor forces.[7]

Although long-term growth in the Ph.D. labor forces will be influenced by future levels of federal support for

TABLE 3.1 Employment Sector and Primary Work Activity of the Ph.D. Labor Forces in the Biomedical and Behavioral Sciences, FY 1973

Biomedical Labor Force	Total (N)	Total (%)	Unempl[a] (%)	Academia: Total Acad (%)	Academia: Tchg (%)	Academia: R&D (%)	Academia: Admn (%)	Academia: Other (%)	Business: Tot Bus (%)	Business: R&D (%)	Business: Mgmt (%)	Business: Other (%)	Federal Govt: Tot Fed (%)	Federal Govt: R&D (%)	Federal Govt: Mgmt (%)	Federal Govt: Other (%)	Other: Tot Other (%)	Other: R&D (%)	Other: Mgmt (%)	Other: Other (%)
TOTAL	47271	100.0	1.1	67.8	32.9	27.0	5.3	2.6	10.1	3.8	5.1	1.3	9.4	5.9	2.9	.6	11.7	5.5	2.9	3.3
Basic Medical Sci Subtotal	26380	100.0	1.2	69.0	29.3	33.7	4.2	1.8	10.5	4.8	4.8	.9	8.6	6.0	2.2	.4	10.8	7.0	2.1	1.7
Anatomy	1672	100.0	1.0	92.5	61.1	22.5	6.6	2.3	.3	—	.3	—	1.3	1.0	—	.3	4.9	2.7	.7	1.5
Biochemistry	7442	100.0	1.9	63.6	21.9	37.3	3.3	1.1	10.8	5.5	5.0	.3	9.3	7.6	1.7	.1	14.4	10.8	2.4	1.2
Biomath, Biostatistics	878	100.0	—	65.1	20.6	32.5	5.0	6.9	14.3	5.3	4.9	4.1	10.1	2.5	6.1	1.5	10.4	3.5	2.8	4.1
Biophysics	1206	100.0	1.7	73.6	22.0	47.1	4.1	.4	5.5	3.8	1.7	—	8.5	6.7	1.7	—	10.8	9.1	1.7	—
Genetics	1923	100.0	.9	79.6	38.7	35.8	2.2	2.8	4.6	1.8	1.9	.9	10.2	8.8	1.2	.3	4.6	3.5	.7	.4
Immunology	1208	100.0	—	57.7	14.2	38.9	4.2	.5	15.2	5.3	8.9	1.1	9.4	6.4	2.7	.4	17.6	12.9	4.1	.6
Microbiology	3812	100.0	1.2	57.0	34.4	15.5	5.4	1.7	16.7	6.8	7.5	2.4	13.5	8.9	3.7	.9	11.4	4.4	4.2	2.8
Molecular Biology	1724	100.0	.4	75.1	16.8	52.7	4.2	1.4	2.7	1.5	.9	.3	5.6	4.6	.6	.3	16.2	14.7	1.2	.3
Pathology	761	100.0	—	67.1	16.8	29.5	10.7	10.1	7.1	3.9	2.0	1.2	3.6	2.5	1.1	—	22.2	5.1	3.8	13.3
Pharmacology	2374	100.0	.2	58.6	24.7	29.8	2.9	1.2	27.2	11.6	13.9	1.8	8.4	3.4	4.0	1.0	5.7	3.7	.8	1.2
Physiology	3380	100.0	1.6	84.5	41.2	38.2	3.9	1.2	2.9	2.0	.9	—	6.2	3.9	2.2	.1	4.8	2.5	.7	1.6
Other Biosciences Subtotal	13844	100.0	1.3	72.2	45.7	18.9	5.2	2.4	6.1	1.6	3.1	1.4	11.7	7.6	3.3	.8	8.7	3.3	2.6	2.8
Biology, General	1623	100.0	.3	83.5	70.5	.9	7.3	4.7	4.6	.3	3.8	.4	5.1	.3	4.1	.7	6.5	.4	1.9	4.2
Botany/Plant Physiology	2625	100.0	1.9	81.1	54.5	20.0	4.3	2.4	1.1	.6	.2	.3	10.6	8.0	1.9	.7	5.3	2.4	.8	2.1
Cytology	695	100.0	1.9	85.3	46.1	35.6	1.7	1.9	—	—	—	—	4.0	4.0	—	—	8.7	4.3	3.0	1.4
Ecology	1719	100.0	.3	75.0	54.7	12.6	5.8	2.0	6.1	.2	1.2	4.6	9.5	6.7	2.1	.6	9.1	3.0	2.6	3.5
Entomology	1756	100.0	1.2	62.0	16.9	34.0	7.7	3.4	2.7	1.1	1.3	.3	26.3	22.7	2.1	1.6	7.8	4.6	1.3	1.9
Epidemiology/Pub Health	821	100.0	—	44.3	21.2	13.9	6.7	2.6	3.2	—	1.9	1.2	21.0	1.0	16.7	3.3	31.5	2.8	16.8	11.9
Nutrition/Food Science	507	100.0	—	27.0	11.6	13.2	.4	1.8	60.4	16.2	35.9	8.3	6.3	3.9	2.4	—	6.3	3.9	1.0	1.4
Parasitology	406	100.0	—	66.5	41.6	18.5	5.2	1.2	4.9	2.5	2.5	—	20.9	14.8	4.7	1.5	7.7	2.5	2.5	2.7
Zoology	1557	100.0	4.4	85.7	72.8	5.7	4.7	2.4	.5	.5	—	—	3.5	2.4	1.1	—	6.0	2.[illegible]	1.5	1.9
Other Biosciences	2135	100.0	.7	67.2	30.6	31.6	4.3	.7	10.7	3.5	5.4	1.8	12.2	8.1	4.0	.1	9.2	6.2	2.2	.8
Other Hlth-Rltd, Subtotal	7047	100.0	.4	54.5	21.2	17.7	9.8	5.8	16.5	4.2	9.9	2.4	8.0	2.1	4.9	1.0	20.6	3.9	6.5	10.2
Biomedical Engineering	897	100.0	.1	66.0	22.9	33.7	8.7	.7	17.3	6.7	10.6	—	7.8	2.7	4.7	.4	8.7	4.1	2.7	1.9
Medical Sci, General	762	100.0	—	44.7	9.7	20.0	10.3	4.7	22.1	3.7	13.8	4.6	13.8	3.2	10.7	—	19.3	6.2	9.3	3.8
Medicine & Surgery	1172	100.0	.4	44.5	9.4	9.8	10.0	15.3	6.6	—	3.8	2.7	5.3	1.4	2.1	1.7	43.3	.9	3.6	38.8
Pharmaceutical Sciences	797	100.0	—	49.4	36.4	3.1	7.6	2.3	44.2	13.1	25.3	5.8	1.1	—	1.1	—	5.2	—	4.1	1.1
Veterinary Sciences	576	100.0	—	70.5	39.1	9.0	16.1	6.3	13.2	2.1	9.0	2.1	8.9	1.7	4.5	2.6	7.5	.9	2.8	3.8
Other Health-Related	2843	100.0	.7	55.9	20.7	21.2	9.2	4.7	11.7	3.2	7.0	1.5	9.3	2.5	5.6	1.2	22.5	6.3	9.6	6.6

TABLE 3.1 (continued)

Behavioral Labor Force	Total (N)	Total (%)	Unempl[a] (%)	Academia: Total Acad (%)	Academia: Tchg (%)	Academia: R&D (%)	Academia: Admn (%)	Academia: Other (%)	Business: Tot Bus (%)	Business: R&D (%)	Business: Mgmt (%)	Business: Other (%)	Federal Govt: Tot Fed (%)	Federal Govt: R&D (%)	Federal Govt: Mgmt (%)	Federal Govt: Other (%)	Other: Tot Other (%)	Other: R&D (%)	Other: Mgmt (%)	Other: Other (%)
TOTAL	31792	100.0	1.1	64.4	43.2	9.5	6.7	5.0	4.3	.9	1.5	1.9	3.7	1.0	1.6	1.1	26.4	2.9	6.7	16.8
Psychology Subtotal	19971	100.0	1.2	54.6	36.0	9.3	5.3	4.0	6.1	1.3	2.0	2.8	4.9	1.3	2.1	1.4	33.2	3.3	8.1	21.8
Clinical	8377	100.0	.9	30.5	17.0	2.1	3.9	7.5	2.4	—	.1	2.3	4.8	.3	1.6	2.8	61.3	1.5	13.3	46.5
Developmental/Gerontol	1176	100.0	1.5	85.7	61.8	14.7	8.0	1.2	—	—	—	—	1.6	.9	.8	—	11.2	4.3	4.0	2.9
Exper/Compar/Physiol	3799	100.0	1.4	83.8	58.2	21.0	3.3	1.3	2.3	1.3	1.0	—	5.9	3.8	1.9	.2	6.6	4.9	1.1	.6
Industrial & Personnel	1491	100.0	1.7	33.2	23.3	3.5	5.9	.5	41.4	4.8	17.4	19.2	10.6	4.7	5.2	.7	13.0	3.5	5.6	3.9
Psychology, General	989	100.0	2.1	87.7	76.1	1.3	8.9	1.3	1.3	—	—	1.3	6.1	1.1	5.0	—	2.8	.8	.7	1.3
Psychometrics	505	100.0	—	62.1	30.6	11.7	15.7	4.2	12.1	8.3	1.0	2.8	1.4	1.0	.4	—	24.5	6.2	5.2	13.1
Social Psychology	1636	100.0	2.1	82.0	53.6	21.3	6.8	.3	2.3	.7	.7	1.0	2.3	—	2.0	.2	11.3	5.2	3.2	2.9
Psychology, Other	1998	100.0	.6	57.1	35.0	11.9	6.9	3.4	9.7	4.5	3.6	1.7	3.5	—	2.0	1.5	29.4	6.2	12.0	11.2
Educ Psych Subtotal	4864	100.0	.5	67.6	38.0	4.6	12.3	12.6	2.3	.3	1.0	.9	1.8	—	.8	.9	27.9	2.3	7.6	18.0
Counseling & Guidance	2178	100.0	.6	75.8	35.6	1.8	13.4	25.0	1.7	—	.4	1.3	2.3	—	.7	1.7	19.6	.4	5.2	14.0
Educational Psychology	1733	100.0	.6	74.5	46.5	10.1	15.0	2.9	4.2	.9	2.4	.8	2.1	—	1.5	.6	18.7	5.7	7.6	5.4
School Psychology	953	100.0	—	36.3	28.1	1.2	4.9	2.1	—	—	—	—	—	—	—	—	63.7	.3	13.1	50.3
Other Behavioral Subtotal	6957	100.0	1.4	90.5	67.3	13.6	7.0	2.7	.8	.3	.2	.2	1.5	.5	.7	.3	5.8	2.2	2.0	1.6
Anthropology	1494	100.0	.9	90.6	73.3	9.2	6.0	2.1	.5	.5	—	—	2.1	.8	1.3	—	5.9	2.7	2.3	.9
Behavior/Ethology	215	100.0	—	94.4	58.6	28.4	7.4	—	—	—	—	—	1.9	1.9	—	—	3.7	1.4	2.3	—
Social Statistics	380	100.0	—	70.4	41.8	9.5	14.0	5.0	2.4	.5	1.9	—	8.5	1.1	4.5	2.9	18.8	6.6	2.9	9.3
Sociology	4868	100.0	1.8	91.9	67.8	14.6	6.7	2.8	.7	.3	.2	.3	.8	.3	.2	.2	4.8	1.7	1.8	1.3

[a]See footnote (7) regarding interpretation of unemployment percentages.

SOURCE: National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

research training as well as by many other factors[8], the supply of biomedical and behavioral Ph.D. recipients available over the short term (i.e., through 1980) can be estimated with reasonable accuracy from knowledge of the number of persons presently in graduate programs and of the age distributions of the current labor forces. Total attrition (death and retirement) between 1973 and 1980 may be approximated by the number of Ph.D. scientists in the 1973 pools who will reach the age of 65 during this period (i.e., the 58-64 age cohorts). Since these cohorts are comparatively small in both the biomedical and behavioral labor forces (see Table 3.2), only about 1 percent annual attrition is expected in each field. On the other hand, the number of academic doctorates currently being awarded annually in the biomedical and behavioral disciplines represents more than 8 percent and 12 percent of the respective 1973 labor forces. Hence, the future growth in these labor forces will be determined largely by the number of Ph.D.'s produced annually during the 1973-79 period.

Estimates of future (1976-79) Ph.D. production can be made based on trends in the ratio of Ph.D. degrees awarded to first-year graduate enrollments six years earlier.[9] Data in Table 3.3 reveal that this ratio has been declining in both fields since the mid-1960's. For illustrative purposes only, it has been assumed that these ratios will continue to decline between 1976 and 1979 at the same rates they did during the preceding 6 or 7 year period (i.e., 6.1 percent annually in the biomedical sciences and 4.3 percent in the behavioral sciences). Under this assumption, the following estimates have been made of the number of Ph.D. recipients in the biomedical and behavioral sciences who will be available in 1980:

	Biomedical Sciences	Behavioral Sciences
1973 Ph.D. labor force	47,275	31,800
1973-79 new Ph.D.'s (estimated)	26,200	27,500
1973-79 attrition (estimated)	3,375	2,000
1980 Ph.D. labor force	70,100	57,300
1973-80 annual growth rate	5.8%	8.8%

TABLE 3.2 Age Distribution of the Ph.D. Labor Forces in the Biomedical and Behavioral Sciences, FY 1973

Biomedical Sciences	Pool Size (N)	Age: Total (%)	<30 (%)	30-39 (%)	40-49 (%)	50-59 (%)	60-69 (%)	>70 (%)	Median Age
TOTAL	47271	100.0	4.5	40.8	31.0	16.5	6.5	.5	41.5
Basic Medical Sciences, Subtotal	26380	100.0	5.3	43.1	30.4	15.1	5.7	.3	40.5
Anatomy	1672	100.0	3.2	38.1	31.7	17.8	9.0	—	42.7
Biochemistry	7442	100.0	6.2	43.5	29.6	14.7	5.5	.4	40.1
Biomath/Biostatistics	878	100.0	7.1	45.8	28.6	12.8	5.8	—	39.4
Biophysics	1206	100.0	5.2	42.5	33.1	15.1	3.6	.5	40.7
Genetics	1923	100.0	4.9	43.3	28.4	16.3	6.4	.6	40.6
Immunology	1208	100.0	7.1	46.1	28.4	15.1	3.2	—	39.3
Microbiology	3812	100.0	2.2	34.7	33.7	21.8	7.2	.4	43.9
Molecular Biology	1724	100.0	9.7	61.5	21.9	4.6	2.2	—	36.6
Pathology	761	100.0	6.0	35.5	32.2	18.4	7.1	.7	42.6
Pharmacology	2374	100.0	3.7	43.4	32.9	15.6	4.3	—	40.9
Physiology	3380	100.0	5.7	44.5	31.5	11.5	6.5	.4	40.0
Other Biosciences, Subtotal	13844	100.0	3.8	37.3	30.8	19.2	8.1	.6	42.9
Biology, General	1623	100.0	4.6	36.4	28.6	17.6	11.8	.7	43.1
Botany/Plant Physiology	2625	100.0	3.5	37.1	30.5	20.4	8.2	.2	43.1
Cytology	695	100.0	10.4	42.6	27.2	12.4	6.5	1.0	39.3
Ecology	1719	100.0	2.3	46.7	26.9	18.0	5.5	.7	40.4
Entomology	1756	100.0	4.3	39.9	31.1	20.6	3.8	.3	41.9
Epidemiology/Public Health	821	100.0	.2	20.8	35.9	28.8	12.0	2.2	48.1
Nutrition/Food Science	507	100.0	5.3	32.3	35.9	18.1	8.3	—	43.4
Parasitology	406	100.0	6.7	28.6	37.5	14.3	11.6	1.2	43.9
Zoology	1557	100.0	1.1	35.1	33.4	17.9	21.1	.4	44.1
Other Biosciences	2135	100.0	4.7	37.6	30.6	19.6	6.5	.6	42.5
Other Health-Related, Subtotal	7047	100.0	3.1	39.4	33.9	16.5	6.0	.9	42.2
Biomedical Engineering	897	100.0	6.6	52.2	32.8	7.8	.7	—	38.3
Medical Sciences, General	762	100.0	3.3	40.3	31.4	15.6	7.5	1.8	42.0
Medicine & Surgery	1172	100.0	3.6	28.0	29.6	26.9	10.8	1.0	46.2
Pharmaceutical Sciences	797	100.0	2.4	41.8	37.9	12.2	3.9	.6	41.4
Veterinary Sciences	576	100.0	—	35.1	40.6	19.6	4.7	—	43.7
Other Health-Related	2843	100.0	2.7	39.9	34.3	15.9	6.0	1.2	42.2

Behavioral Sciences	Pool Size (N)	Age: Total (%)	<30 (%)	30-39 (%)	40-49 (%)	50-59 (%)	60-69 (%)	>70 (%)	Median Age
TOTAL	31792	100.0	4.6	38.0	32.1	19.2	5.5	.5	42.3
Psychology, Subtotal	19971	100.0	5.5	41.0	31.3	17.3	4.4	.4	41.1
Clinical	8377	100.0	3.8	38.4	33.3	19.5	4.3	.5	42.3
Developmental & Gerontological	1176	100.0	7.6	41.0	32.7	14.3	4.5	—	40.4
Exper/Compar/Physiol	3799	100.0	7.9	57.5	25.5	7.5	1.6	—	37.3
Industrial & Personnel	1491	100.0	6.8	31.1	32.0	22.0	7.3	.7	43.8
Psychology, General	989	100.0	1.9	25.4	33.0	28.4	10.7	.6	46.9
Psychometrics	505	100.0	5.1	41.8	25.0	17.2	9.7	—	41.0
Social	1636	100.0	9.2	44.9	26.9	15.8	3.3	—	39.1
Other	1998	100.0	4.4	32.2	37.2	21.1	4.6	.6	43.6
Educational Psychology, Subtotal	4864	100.0	2.7	27.4	37.8	23.2	7.9	.8	45.3
Counseling & Guidance	2178	100.0	1.5	27.1	36.8	23.9	9.4	1.3	45.8
Educational	1733	100.0	3.9	29.4	35.8	22.8	7.6	.5	44.7
School	953	100.0	3.0	24.7	43.4	22.5	5.0	.4	45.0
Other Behavioral Sci, Subtotal	6957	100.0	3.3	36.6	30.4	21.6	6.8	.6	43.2
Anthropology	1494	100.0	2.6	38.5	36.2	17.3	4.7	.7	42.5
Behavior/Ethology	215	100.0	—	63.3	24.7	9.8	2.3	—	37.9
Social Statistics	380	100.0	8.4	40.9	25.3	18.2	7.1	—	40.3
Sociology	4868	100.0	3.2	34.6	29.2	23.8	7.7	.7	44.0

SOURCE: National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

TABLE 3.3 Ph.D. Degrees as a Proportion of First-year Graduate Enrollments Six Years Earlier, 1966-75

Year	Biomedical Sciences			Behavioral Sciences		
	Ph.D.'s Awarded	First-Year Enrollments[a] (6 yrs. earlier)	Ratio	Ph.D.'s Awarded	First-Year Enrollments[a] (6 yrs. earlier)	Ratio
1966	2309	4340	.532	1496	3789	.395
1967	2537	4634	.547	1788	3947	.453
1968	3020	5084	.594	1991	4387	.454
1969	3353	5973	.561	2444	5282	.463
1970	3702	7361	.503	2730	6328	.431
1971	4067	8486	.479	3082	7667	.402
1972	3987	9310	.428	3246	8362	.388
1973	4022	9528	.422	3431	9365	.366
1974	3841	9475	.405	3649	9952	.367
1975	3894[b]	10157	.383	3857[b]	10859	.355

[a]U.S. Office of Education data on 1960-69 first-year (full-time) graduate enrollments, lagged six years to correspond with subsequent doctorate production. The following enrollment figures would correspond to 1976-79 doctorates.

Year	Biomedical	Behavioral
1976	10449	12312
1977	10934	13064
1978	11445	13338
1979	11217	13355

[b]Preliminary estimates from the 1975 Survey of Earned Doctorates.

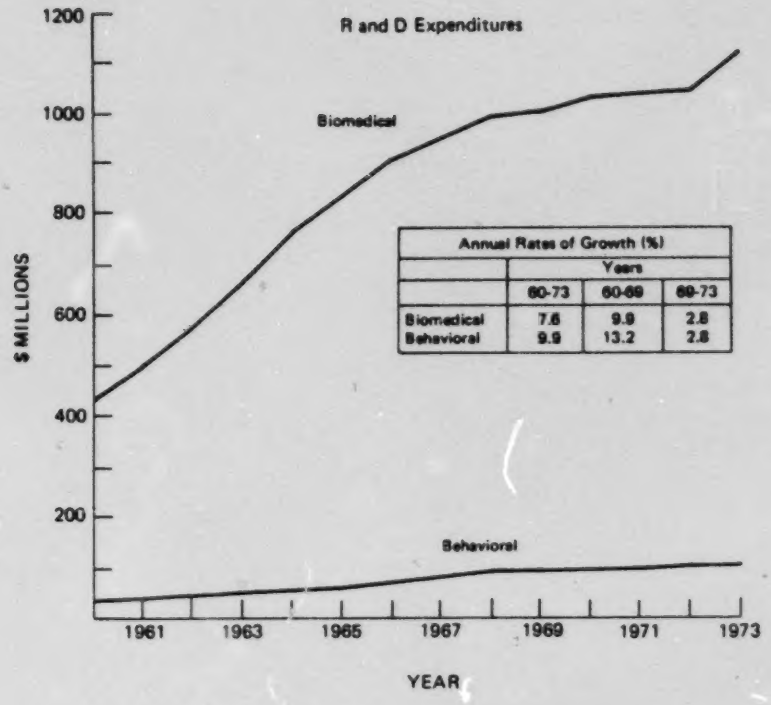
SOURCES: National Research Council, Survey of Earned Doctorates, 1966-75; and U.S. Department of Health, Education, and Welfare, Office of Education, Students Enrolled for Advanced Degrees, Washington, D.C.: U.S. Government Printing Office, 1960-73 (annual).

Reasonable alternative assumptions about the numbers of academic doctorates to be awarded between 1976 and 1979 will not change appreciably the 1980 labor force estimates. For example, if the annual Ph.D. production in each field decreases from 3,900 degrees awarded in 1975 to 2,500 degrees in 1979, the biomedical and behavioral labor forces would still expand at annual rates of growth of 5.3 and 7.5 percent, respectively. On the other hand, if annual Ph.D. production were to rise to 5,000 degrees awarded in each field in 1979, the corresponding annual growth rates would be increased to 6.6 percent for the biomedical labor force and 9.2 percent for the behavioral labor force. The Committee believes from these considerations that it is reasonable to expect that the biomedical and behavioral Ph.D. labor forces will continue to expand significantly during the next 5 years.

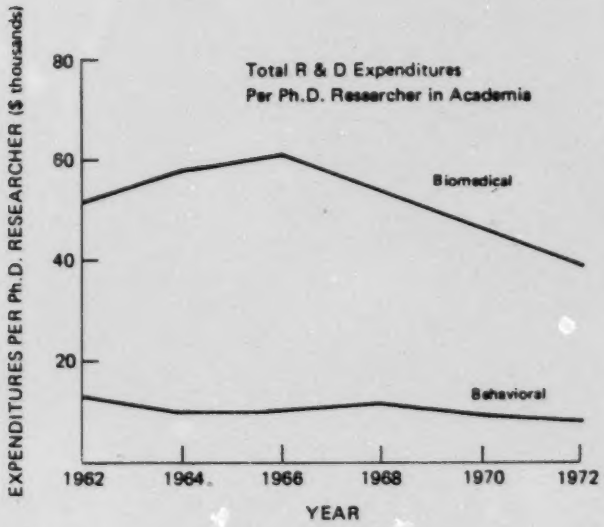
Turning to the demand side, it was noted in Chapter 2 that R and D expenditures and total enrollments have been the primary determinants of the number of employment positions available to Ph.D. scientists in the biomedical and behavioral fields. While it has not been possible to quantify this relationship, primary work activity distributions imply that the biomedical sciences labor market has been influenced more by R and D funds than has the behavioral sciences market. The upper graph in Figure 3.1 illustrates the growth of R and D expenditures in academia in these fields. In recent years the annual growth rates of constant dollar expenditures in research and development in the academic sector[10] have fallen below 3 percent in both fields. Since Ph.D. employment in academia has grown significantly during this same period, the expenditures per academic researcher[11] (lower graph, Figure 3.1) have declined, especially in the biomedical sciences.

The growth rates of total graduate and undergraduate enrollments in the behavioral sciences (upper graph, Figure 3.2) have decelerated since 1969, and Office of Education projections[12] indicate that enrollments in all sciences are expected to stabilize by 1980. As illustrated in the lower graph of Figure 3.2, the total enrollments per Ph.D. employee in the academic sector have started to decline in both the biomedical and behavioral sciences. It is quite evident from the above findings that the primary factors affecting the demand for Ph.D. scientists in these fields are presently growing at substantially slower rates than in the past. If these trends continue, increases in R and D expenditures and enrollments will not generate an adequate number of employment opportunities for all of those expected to earn academic doctorates in the biomedical and behavioral sciences during the next 5 years.

The preceding analysis should be interpreted as an indication of what the employment market situation would be like if recent trends in major factors affecting the market for Ph.D. scientists in these fields were to continue.

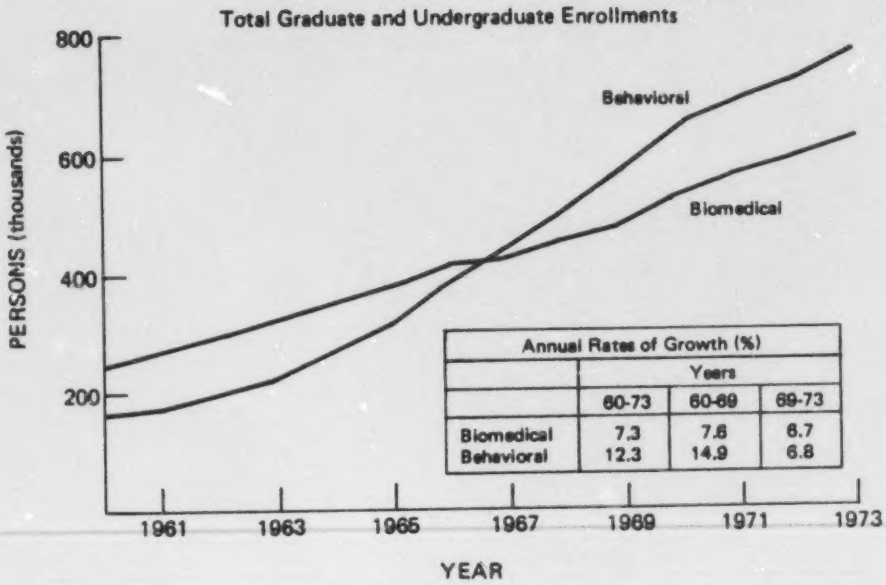


Annual Rates of Growth (%)			
	Years		
	60-73	60-69	69-73
Biomedical	7.6	9.9	2.8
Behavioral	9.9	13.2	2.8

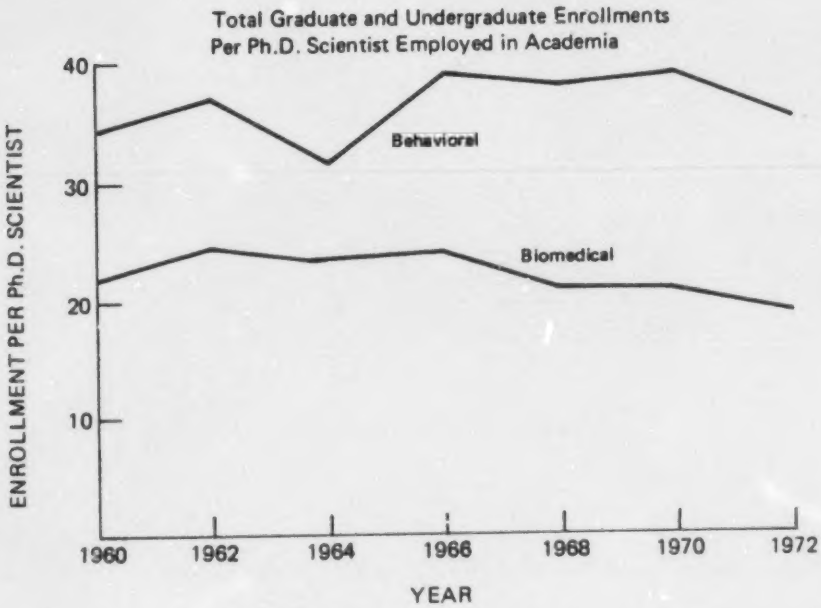


NOTE: See Table II.4 in Appendix II for supporting data.

FIGURE 3.1 Total R and D Expenditures in Academia and Expenditures Per Ph.D. Researcher in the Biomedical and Behavioral Sciences, 1960-73 (1967 constant dollars)



Annual Rates of Growth (%)			
	Years		
	60-73	60-69	69-73
Biomedical	7.3	7.6	6.7
Behavioral	12.3	14.9	6.8



NOTE: See Table II.5 in Appendix II for supporting data.

FIGURE 3.2 Total Graduate and Undergraduate Enrollments and Enrollments Per Ph.D. Scientist Employed in Academia in Biomedical and Behavioral Fields, 1960-73

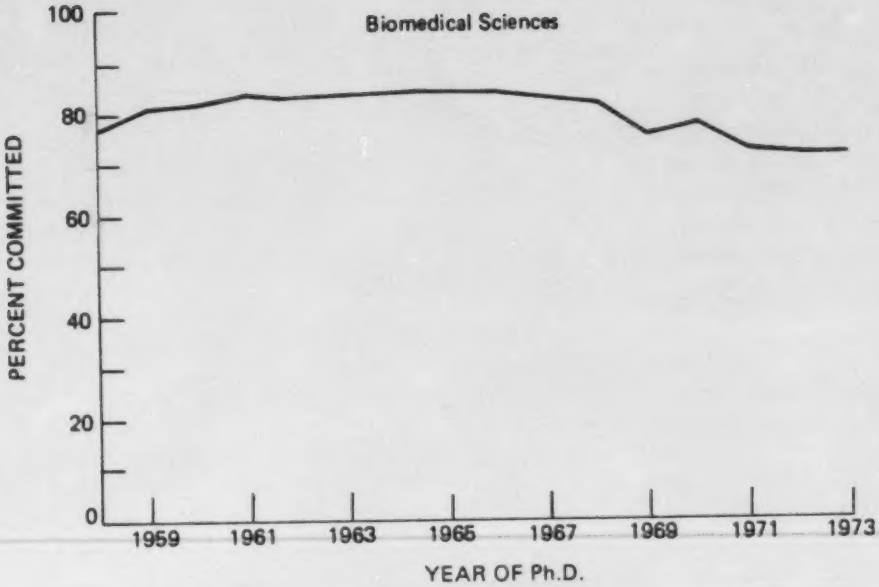
However, publication of forecasts such as those referred to in Footnote 2 frequently injects new factors into the market that change the conditions on which the forecasts are based. As the Bureau of Labor Statistics notes in its recent manpower study:

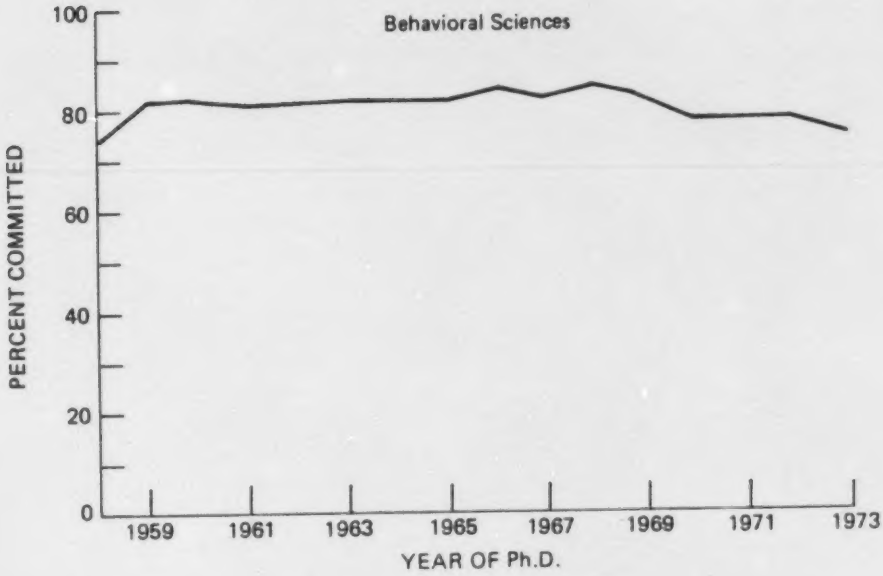
> Underlying the projections...are the assumptions that changes in relative wages, the desire for education, and other factors will have little effect on the educational patterns and career choices of young persons, and that conditions will not arise whereby employers will significantly change the trend in the utilization patterns for Ph.D. manpower.[13]

These underlying assumptions are likely to prove correct only if supply and demand are in equilibrium. The Committee believes that, as a result of perceptions of the projected supply/demand imbalance, significant changes in the utilization of recent Ph.D. recipients in the biomedical and behavioral sciences are already occurring and that no severe unemployment situation will develop. During the next 5 years, nearly all of the new Ph.D. recipients in these fields should find employment, although many may take positions that in the past have not been regarded as appropriate for persons with their training. Some of those in nontraditional positions may fully utilize their Ph.D. training; others may be disappointed because the employment positions available to them do not meet their expectations. If this potential imbalance in supply and demand in fact occurs and continues well beyond 1980, some adjustment in the number and perhaps caliber of persons attracted to graduate programs in the biomedical and behavioral sciences is also likely to occur.

The significance of these market analyses is related not only to the magnitude of any projected oversupply, but also to the changes that may result in the supply and utilization patterns of these scientists. To what extent will persons with academic doctorates in these fields not have the opportunity to apply their research training? Will the qualifications of persons entering these labor forces in the future be affected by the declining market conditions?

Data describing the 1973 Ph.D. labor forces reveal not only that there was no serious unemployment situation, but also that more persons were working in the biomedical and behavioral sciences than had received training in these fields.[14] Nevertheless, there also have been some indications that the job prospects for new graduates have not been as promising as they once were. As illustrated in Figure 3.3, the proportion of Ph.D. recipients in both the biomedical and behavioral sciences who have had definite job commitments at the time of graduation has declined since the mid-1960's. Although this proportion has not fallen below





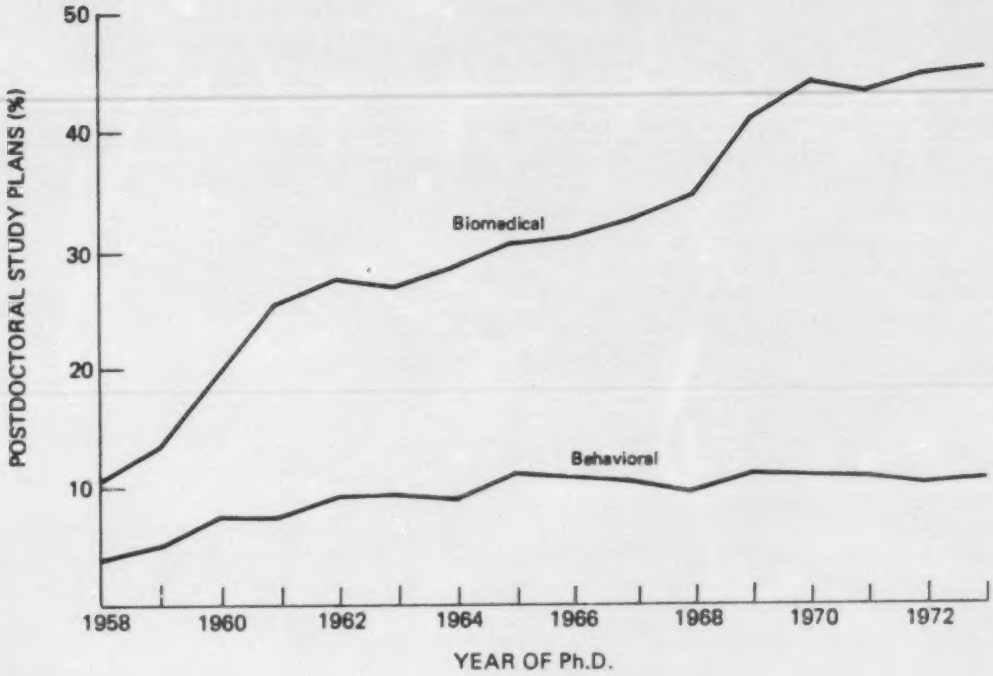
NOTE: See Table II.6 in Appendix II for supporting data.

FIGURE 3.3 Proportion of U.S. Ph.D. Recipients in the Biomedical and Behavioral Sciences with Definite Employment Commitments at the Time of Graduation, 1958-73

70 percent in either field (it had been as high as 83 percent), it is the lowest figure in 15 years and does suggest that recent graduates are encountering increasing difficulty in finding employment that meets their expectations. An equally important change has been the steady rise in the proportion of Ph.D. recipients in the biomedical and behavioral sciences planning postdoctoral study (Figure 3.4). While, on the one hand, this increase has led to a more highly trained pool of research personnel, it also may have postponed some of the impact from a developing shortage of employment opportunities. More than one-fourth of the Ph.D. recipients holding postdoctoral appointments in 1973 in the biomedical and behavioral sciences indicated that they had accepted their appointment because a suitable employment position was not available.[15]

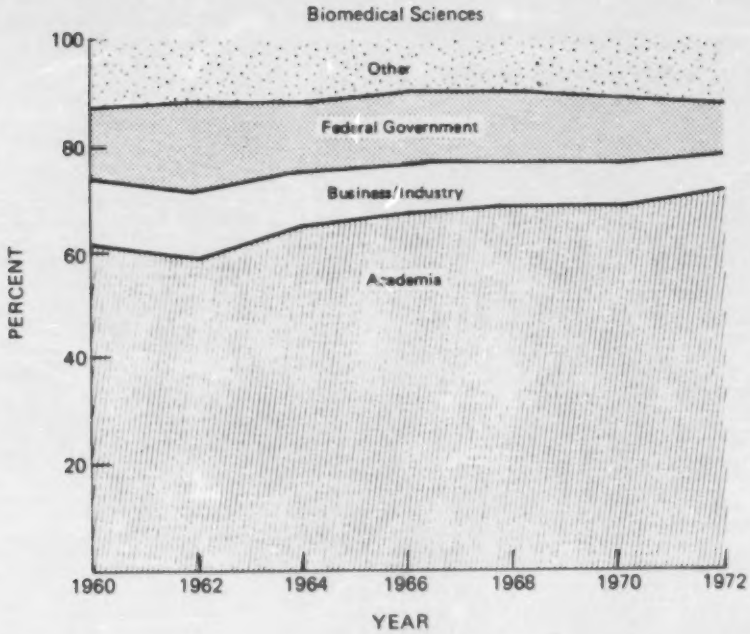
The pattern of utilization of persons employed in the biomedical and behavioral sciences also has been changing. As shown in Figure 3.5, there has been a significant increase in academic employment among persons entering the Ph.D. labor forces since the early 1960's. Despite this trend and the corresponding rise in postdoctoral study plans, the level of research activity among new graduates has declined slightly. Data described in Figure 3.6 indicate that 88 percent of the biomedical and 61 percent of the behavioral scientists who had just earned academic doctorates were engaged in some research activity in 1972. Comparable figures 6 years earlier were 92 and 68 percent, respectively. These percentage decreases are small and do not represent a reduction in the actual number of Ph.D. researchers.[16] Thus far, the decline in research activity of new graduates employed in permanent positions has been offset, at least in part, by increases in postdoctoral appointments.

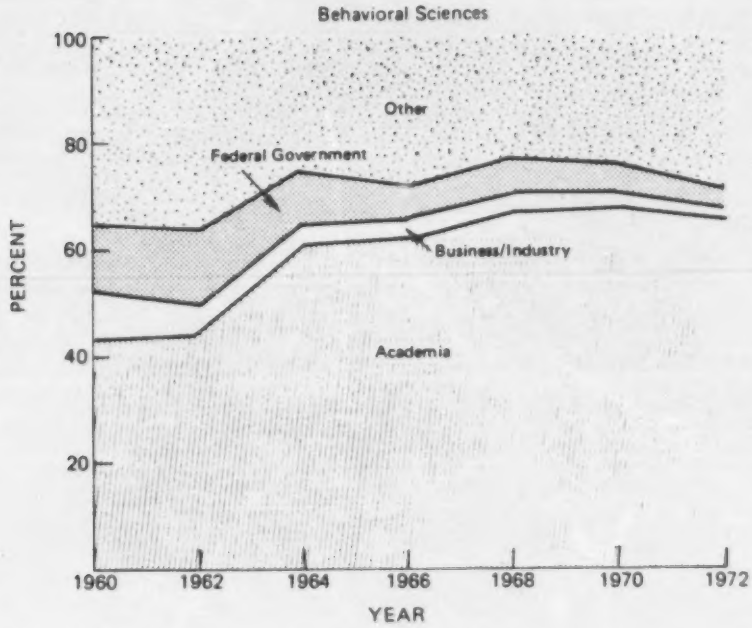
However, if recent trends in the market forces continue, as is expected, it seems unlikely that there will be enough postdoctoral positions to absorb the growing number of new Ph.D. recipients unable to find employment that fully utilizes their research training (especially in the biomedical market, where already more than one-third of the most recent graduates held postdoctoral appointments). At the present time there are no signs of significant expansion outside the academic sector. Consequently, many of the new Ph.D. recipients in the biomedical and behavioral sciences are likely to replace less highly trained personnel, primarily in the academic sector.[17] While this replacement may be considered by the employer as an enrichment of the work force, it also will probably lead to some dissatisfaction on the part of those whose training is not being fully utilized. It is difficult at this time to foresee what effect this situation will have both on the caliber of individuals attracted to Ph.D. programs in the biomedical and behavioral sciences and on the programs themselves.



NOTE: See Table II.7 in Appendix II for supporting data.

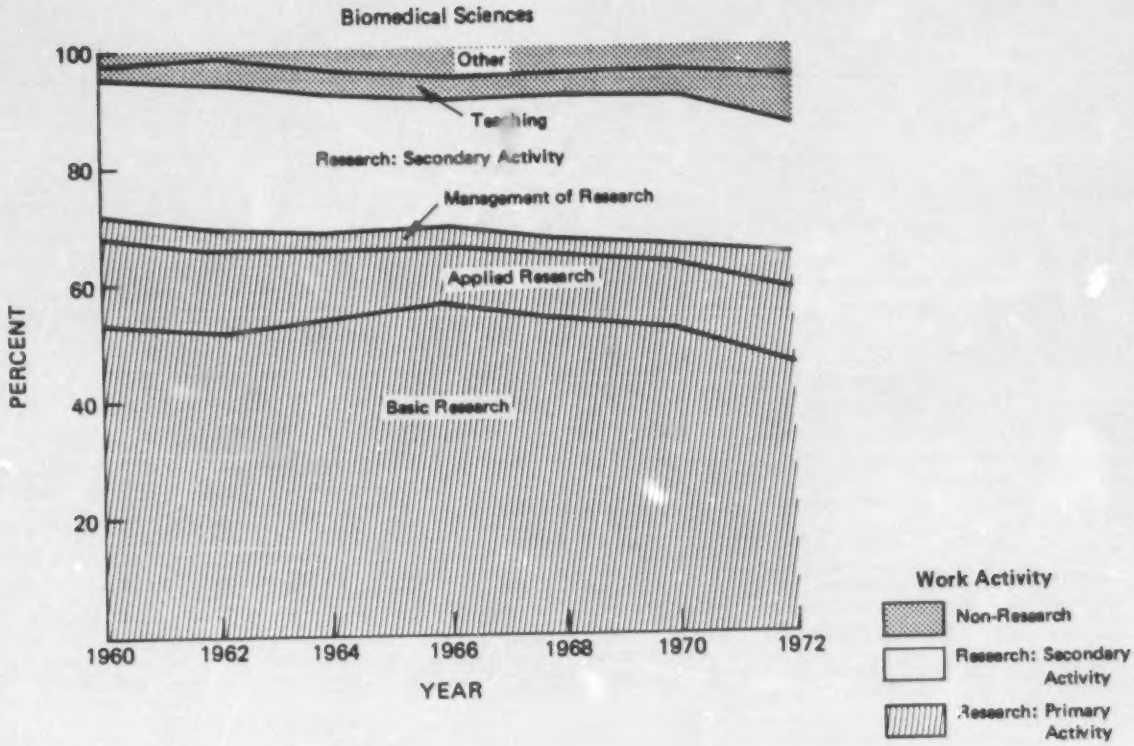
FIGURE 3.4 Proportion of U.S. Ph.D. Recipients in the Biomedical and Behavioral Sciences Planning Postdoctoral Study, 1958-73

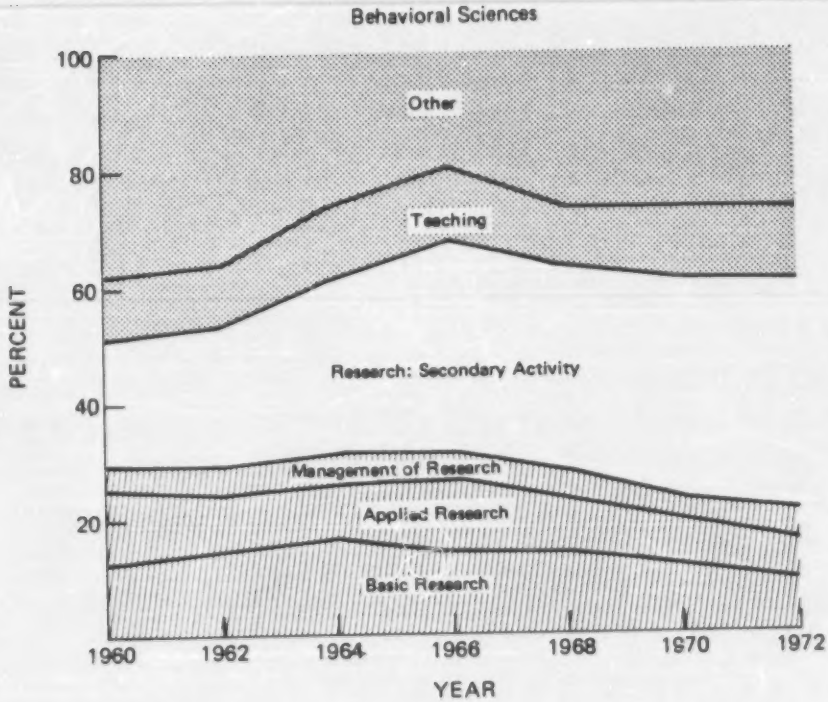




NOTE: See Table II.8 in Appendix II for supporting data.

FIGURE 3.5 Employment Sector Distribution of Entrants to the Ph.D. Labor Forces in the Biomedical and Behavioral Sciences, 1960-72





NOTE: See Table II.9 in Appendix II for supporting data.

FIGURE 3.6 Work Activity Distribution of Entrants to the Ph.D. Labor Forces in Biomedical and Behavioral Sciences, 1960-72

THE MARKET FOR POSTPROFESSIONAL INVESTIGATORS IN THE CLINICAL SCIENCES

The labor market that is the subject of this section consists, on the supply side, of those individuals qualified to perform clinical research and teaching and, on the demand side, of employers of those individuals--primarily the medical schools. It is not too clear, however, how one should measure the demand for these clinical researchers, and still less clear how one should define and measure the total supply of qualified persons available to meet the demand.

As noted above, clinical research, broadly defined as research dealing with the problems of diseases in man, is primarily but not exclusively the province of the researcher with a professional degree (hereafter referred to as M.D.'s). The physician's knowledge of the cause, diagnosis, and treatment of disease is of course vital to clinical research. Often it is combined in multidisciplinary teams with the Ph.D.'s knowledge of the basic sciences to produce a more effective approach to the solution of clinical problems. Those individuals with both the M.D. and the Ph.D. degrees form a small but vital corps of researchers and frequently are among the most productive scientists. The number of Ph.D. recipients each year who also have a professional degree has been steadily increasing--a fact that attests to the importance of broadly based training in the biosciences. The Doctorate Records File shows that there were 361 such Ph.D. recipients in 1972, compared to only 90 in 1958. This represents an average increase of more than 10 percent per year.

The training programs are designed to produce M.D. and Ph.D. scientists with a range of skills broad enough to qualify them for the research and teaching duties required of members of a medical school faculty. It is certainly true that the M.D. degree alone does not generally provide the necessary qualifications for a productive research career. On the other hand, one cannot estimate the supply of clinical researchers simply by counting the products of NIH or ADAMHA training grants or fellowship programs. Private foundations and national and state voluntary health organizations also provide fellowships for postdoctoral study. The armed forces and federal agencies provide on-the-job research experience for many individuals. All of this makes it quite difficult to estimate the total supply of qualified clinical research scientists.

The question of what kinds of training and education are required to prepare an M.D. for a career in research and teaching is a vital one that cannot be fully answered at this time. The Committee will assign a high priority to this issue as it continues to analyze the nation's need for research personnel in the biomedical fields. However, there are certain observations that can be made regarding recent

trends in the primary activities of physicians in the United States and in the number of M.D.'s whose research training has been supported by the NIH.

The American Medical Association maintains a record of the location and activities of all physicians in the United States and prepares an annual report on them.[18] Its data show that the number of physicians reporting teaching, administration, or research as a primary activity has declined from about 32,000 in 1968 to about 26,500 in 1973 (Table 3.4). This represents an average annual decrease of 3.8 percent, but the large increase in the "unknown activity" category in Table 3.4 subjects this estimate to considerable uncertainty. However, this indication of a downward trend in research activity is reinforced by the number of individuals with professional doctorate degrees undertaking research training supported by the NIH, which has declined from 5,278 in 1968 to 3,170 in 1973. This is an average annual decrease of 9.7 percent. During the same period, medical school faculties have been expanding at about 6 percent per year (Figure 3.7). Thus it appears that, although we cannot adequately measure the total supply of M.D. researchers, we can detect trends implying that the supply is dwindling at the same time as the need for clinical faculty is increasing.

Let us now consider the situation on the demand side in greater detail. Certain relationships among the variables used to describe medical school faculties and enrollments are apparent by observing their trends over time, while other relationships can be postulated and tested empirically. An example of a fairly obvious relation is that which occurs between budgeted vacancies in medical school faculties and total R and D expenditures in medical schools. The behavior of these two variables is almost identical over the 1961-73 period (Figure 3.8), and the correlation between them is 0.96. Furthermore, the ratio of clinical faculty to medical student enrollment (CF/M) also follows this same general pattern over that time period.

This suggests that the demand for clinical faculty in medical schools can be modeled in a fashion similar to the demand model for biomedical Ph.D.'s outlined above. In this model, we postulate that the demand for clinical faculty in medical schools is composed of a teaching component, represented by medical student enrollments, and a research component, represented by R and D funds expended in medical schools. Saying it another way, the clinical faculty/student ratio in medical schools is closely correlated with the pattern of R and D expenditures. Applying this model to data for the 1961-73 period, we derive the following empirical relationship:

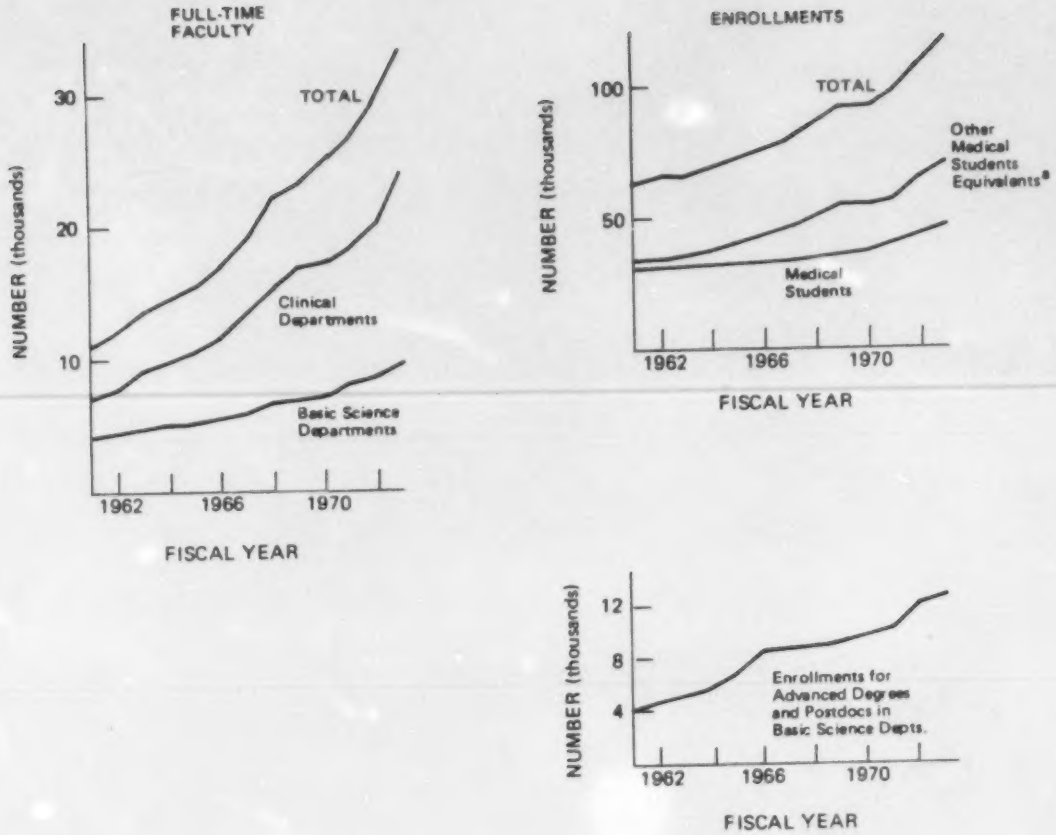
TABLE 3.4 Research and Training Activity of M.D.'s, 1968-73

			FISCAL YEAR						
			1968	1969	1970	1971	1972	1973	Average Annual Rate of Change
PRIMARY WORK ACTIVITY OF ACTIVE MD's	Research	N	15441	12375	11929	10898	9290	8332	-11.6%
		%	5.2	4.1	3.8	3.3	2.8	2.4	
	Teaching	N	5051	5149	5588	5844	5636	6183	+ 4.1%
		%	1.7	1.7	1.8	1.8	1.7	1.8	
	Administration	N	11715	12109	12158	12076	11074	11959	+ 0.4%
		%	3.9	4.0	3.9	3.7	3.3	3.5	
	Subtotal	N	32207	29631	29675	28818	26000	26474	- 3.8%
		%	10.8	9.7	9.4	8.8	7.7	7.7	
	Patient Care	N	261722	270737	278535	287248	292210	295257	+ 2.4%
		%	87.7	88.8	88.6	88.3	86.9	85.9	
	Other[a]	N	2383	2598	2635	2633	2693	2636	+ 2.0%
		%	0.8	0.9	0.8	0.8	0.8	0.8	
	Unknown	N	2089	2081	3362	6736	15521	19388	+56.1%
		%	0.7	0.6	1.1	2.1	4.6	5.6	
	TOTAL	N	298401	305047	314407	325435	336424	343755	+ 2.9%
		%	100.0	100.0	100.0	100.0	100.0	100.0	
NIH SUPPORT OF TRAINEES AND FELLOWS WITH PROFESSIONAL DOCTORATE DEGREES[b]	New Starts		2006	1822	1686	1541	1524	1549	- 5.0%
	Total In Training		5278	5199	4669	4535	3876	3170	- 9.7%

[a]Includes such activities as journalism, law, sales, etc.

[b]Includes both full-time and part-time students in NIH research training programs.

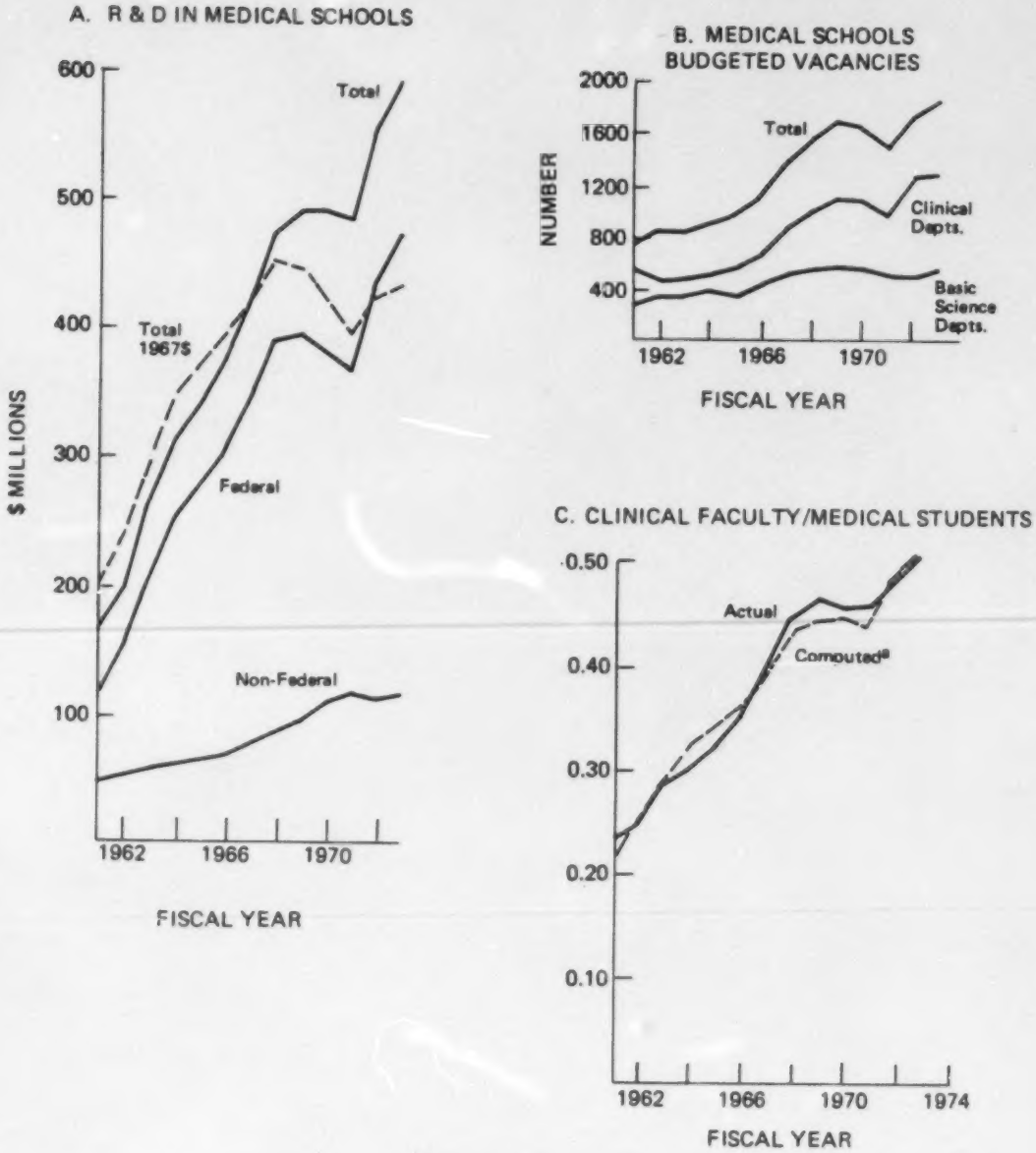
SOURCES: American Medical Association, Center for Health Services Research and Development, Distribution of Physicians in the U.S., Chicago, Ill. (annual); National Research Council, Commission on Human Resources, Roster of NIH Trainees and Fellows.



[a]Includes nurses, interns, residents, predoctoral and other students converted to medical student equivalents.

SOURCE: *Journal of the American Medical Association*, Education Number, annually in November, 1960-74.

FIGURE 3.7 Medical School Full-time Faculty and Enrollments, 1962-72



[a]Computed from the equation; $(CF/M)_i = 0.099 + 7.09 \times 10^{-7} (MR\&D)_i$. See Table 3.5.

SOURCES: National Science Foundation, *Expenditures for Science and Engineering Activities at Universities and Colleges, FY 1974*, Detailed Statistical Tables, p. 5; and *Journal of the American Medical Association*, Education Number, annually in November, 1960-74.

FIGURE 3.8 Medical School Research and Development Expenditures, Budgeted Vacancies, and Clinical Faculty/Student Ratio

$$(CF/M)_i = 0.099 + 7.09 \times 10^{-7} (MR\&D)_i$$

where $(CF/M)_i$ = ratio of size of clinical faculty in medical schools to total medical student enrollment in the ith year;

$(MR\&D)_i$ = total research and development expenditures in medical schools in the ith year ($ thousands).

This model fits the data for the 1961-73 period quite well, as indicated in Figure 3.8(c), where the values of CF/M predicted by the model are compared with their actual values.[19]

As with all models, there is the danger here that new factors will emerge that will alter the conditions determining the demand for clinical faculty in future years. One such factor might be the tendency for some M.D.'s on clinical faculties to engage more in patient care activities and less in research. In the recent past, sponsored research, which currently accounts for about 28 percent of the medical school budget, declined in relative terms, while fees from professional services, which now constitute about 7 percent of the budget, became increasingly important. For the past 2-3 years, on the other hand, these levels have remained relatively stable. If they were again to change, then faculty positions would become less dependent on R and D budgets and more on funds generated by patient care. To the extent that these movements may again begin in the future, the demand model as specified above would have to be modified to incorporate this new factor, even though it presently provides an adequate explanation of past patterns.

The model can serve as the vehicle for making rough estimates of the demand for clinical faculty in 1980 under various assumptions about the future course of medical school enrollments and R and D expenditures. Under a very conservative assumption of no growth in R and D expenditures from 1974 to 1980, the need for clinical faculty is projected to rise by 5.7 percent per year from 1973 due to projected growth in medical student enrollments (Table 3.5).

Under the less conservative assumption that R and D expenditures in medical schools will continue to grow at the 1968-73 rate of 3.1 percent per year, clinical faculty is expected to expand by 7.7 percent per year to 1980. These results are shown in Table 3.5.

We conclude from this analysis that the demand for clinical faculty in medical schools can be expected to grow at a rate of between 5 and 8 percent per year up to 1980. This contrasts with indications that the supply of M.D.

TABLE 3.5 Medical School Enrollments, R and D Expenditures, and Clinical Faculty 1961-73, with Projections to 1980

	Fiscal Year	Medical Student Enrollment (M)	Total R & D in Medical Schools ($ millions)	Size of Clinical Faculty (CF)	Ratio of Clinical Faculty to Med Student Enrollments (CF/M)
Actual Data	1961	30288	167.52	7108	0.2347
	1962	30836	206.23	7698	0.2496
	1963	31491	264.42	8965	0.2847
	1964	32201	311.85	9632	0.3010
	1965	32428	342.90	10381	0.3201
	1966	32835	375.12	11489	0.3499
	1967	33423	420.23	13292	0.3977
	1968	34538	473.27	1543[illegible]	0.4469
	1969	35833	489.31	1662[illegible]	0.4640
	1970	37669	489.61	1718[illegible]	0.4562
	1971	40487	480.98	18451	0.4557
	1972	43650	550.86	20902	0.4789
	1973	47546	587.68	24047	0.5057
Projections, 1974-80[a]					
Assumption I: Medical students increase at 1968-73 rate (4.7%/year); R and D increases at 1968-73 rate (3.1%/year).	1974	49808[b]	605.9[b]	23643[b]	0.475[b]
	1975	52150	624.7	28260	0.542
	1976	54600	644.0	30340	0.556
	1977	57170	664.0	32570	0.570
	1978	59850	684.6	34980	0.584
	1979	62670	705.8	37560	0.599
	1980	65610	727.7	40340	0.615
Average Annual Growth Rate, 1973-80		4.7%	3.1%	7.7%	2.8%
Assumption II: Medical students increase at 1968-73 rate (4.7%/year); R and D remains at 1974 level.	1974	49808[b]	605.9[b]	23643[b]	0.475[b]
	1975	52150	605.9	28260	0.542
	1976	54600	605.9	29590	0.542
	1977	57170	605.9	30980	0.542
	1978	59850	605.9	32430	0.542
	1979	62670	605.9	33960	0.542
	1980	65610	605.9	35550	0.542
Average Annual Growth Rate, 1973-80		4.7%	0.4%	5.7%	1.0%

[a]Projections to 1980 were based on the equation:

$$(CF/M)_i = 0.09897 + 7.0901 \times 10^{-7} \ (MR\&D)_i$$

where $(CF/M)_i$ = ratio of size of faculty in clinical departments in medical schools to medical student enrollments in the ith year:

$(MR\&D)_i$ = research and development expenditures in medical schools in the ith year (in thousands of dollars). These data were not deflated because the unadjusted figures result in a higher correlation with (CF/M).

This equation was derived empirically from data for 1961-73, with 97.7 percent of the variation in (CF/M) explained by MR&D. Under assumptions I and II as stated in the above table, the values of MR&D for 1974 to 1980 were calculated and used in this equation to predict values of (CF/M). This predicted ratio was then multiplied by the projected values of M (medical student enrollments) to derive the predicted value of CF (clinical faculty).

[b]Actual value.

SOURCES: National Science Foundation, Expenditures for Scientific and Engineering Activities at Universities and Colleges, FY 1974, Detailed Statistical Tables, p.5; Journal of the American Medical Association, Education Number, annually in November, 1960-74.

researchers, while unknown in absolute terms, seems to be on the decline. A continuation of these trends could lead to shortages of qualified M.D. researchers.

THE MARKET FOR HEALTH SERVICES RESEARCHERS

Health services research must be understood as an occupation entered by researchers trained in one of a number of basic fields who apply their research training to the improvement of health care. For the purposes of this study, epidemiology/public health is the discipline that most easily identifies scientists whose research training leads directly to work in the field of health services research. However, unlike the basic biomedical sciences, health services researchers cannot be identified simply by the discipline in which the academic degree was granted. It is an applied field, not a basic science, and therefore proper classification of an individual as a researcher in this area requires knowledge of his or her field of application--information that is not easily obtained. Most health services researchers practicing in the field at this time entered from such academic disciplines as economics, sociology, statistics, epidemiology, and public health. Hence, health services research is not an academic discipline in the traditional sense of the term.

The indications are that the number of scientists with experience in health services research is not increasing very rapidly. For example, in 1968 the American Medical Association[20] reported that there were about 3,000 physicians who listed public health as their specialty, some 270 of whom were primarily engaged in research or teaching. In 1973, there were just over 2,700, of whom only about 225 were primarily engaged in research or teaching. The same general trend is also observed in the specialty of general preventive medicine, which is the other discipline identified in the files of the American Medical Association associated with health services research activities. So, although these specialty categories do not adequately describe the field of health services research, they are the ones most closely related to it in the American Medical Association's list, and the trend in both categories is down.

Also in 1973, there were an estimated 821 Ph.D.'s employed in the field of epidemiology/public health. Of these, 361, or 44 percent, were employed in academia. The others were employed by state or local governments (32 percent), the federal government (21 percent), and business (3 percent). Only 145, or 18 percent, of these Ph.D.'s listed research as their primary activity in 1973.[21]

These numbers are not intended to be an estimate of the total supply of qualified health services researchers, but

they may serve to approximate the available pool of scientists in those disciplines most commonly associated with this field.

The demand for health services researchers stems from: (1) developments in the theoretical and methodological aspects of health services research toward a greater degree of sophistication; (2) the need to transmit the knowledge and skills required for health services research to students of this field in which graduate enrollments are rapidly growing; and (3) the development of health manpower and health services legislation, creating a greater need for persons skilled in research to improve health care organization and delivery.

In its report of March 1972, the Panel on Health Services Research and Development of the President's Science Advisory Committee[22] tabulated federal expenditures for health services R and D from 1967 through 1972. As shown in Table 3.6, these expenditures grew at an average rate of 24 percent per year during that period--much faster than either biomedical research or national health expenditures. Furthermore, the report estimated that about $350 million would be spent on health services R and D in 1974, an amount considerably above the 1972 figure, indicating that the steep growth in this area is continuing.

Estimates of the number of doctoral level health services researchers required by 1980 range from 1,200 to 2,000.[23] Since Ph.D.'s in public health are currently being produced at the rate of about 100 per year, it does not appear that the field of health services research is heading for an oversupply situation in the next few years.

SUMMARY

Findings from the preceding analyses of the Ph.D. labor markets in the biomedical and behavioral sciences differ from conclusions reached about the need for clinical and health services researchers. Most basic biomedical and behavioral research is performed by persons with academic doctorates, and there is some evidence that the employment opportunities for these, as well as other Ph.D. scientists,[24] will not abound as they did during the 1960's. The annual growth rates of both R and D expenditures in academia and total (graduate and undergraduate) enrollments--and primary determinants of demand for basic biomedical and behavioral Ph.D. recipients--have already declined, and the Office of Education projections show that enrollments should level off by 1980.

On the supply side, the number of Ph.D.'s awarded annually in the biomedical and behavioral fields, although not increasing as rapidly as in previous years,[25] will substantially exceed the loss due to attrition, resulting in

TABLE 3.6 Federal Expenditures for Health Services R and D and Biomedical Research in Relation to National and Federal Health Expenditures, 1967-72 (millions of dollars)

Expenditures	Fiscal Year					
	1967 ($millions)	1968 ($millions)	1969 ($millions)	1970 ($millions)	1971 ($millions)	1972 ($millions)
National Health expenditures	47,900	53,600	59,900	67,200	75,000	81 000
Federal Health expenditures	10,801	14,132	16,556	18,072	20,698	22,247
Health Services R and D:						
Amount	82	100	166	179	222	238
Percent of National Health expenditures	0.2	0.2	0.3	0.3	0.3	0.3
Percent of Federal Health expenditures	0.8	0.7	1.0	1.0	1.1	1.1
Biomedical Research:						
Amount	1,364	1,547	1,547	1,582	1,747	1,878
Percent of National Health expenditures	2.9	2.9	2.6	2.4	2.3	2.3
Percent of Federal Health expenditures	13	11	9	9	9	8

SOURCE: President's Science Advisory Committee, Improving Health Care through Research and Development. A report of the Panel on Health Services Research and Development of the President's Science Advisory Committee, Office of Science and Technology, Executive Office of the President, Washington, D.C., U.S. Government Printing Office, March 1972, p. 38.

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an expected annual net growth in these labor forces of 5.5 and 8.4 percent, respectively. As an immediate consequence of the potential supply/demand imbalance, the Committee anticipates that an increasing proportion of the Ph.D. recipients in these fields will not find employment that fully utilizes their research training. A slight decrease in the research activity of recent graduates has already been observed. Postdoctoral study in both these fields has become increasingly popular and may, in fact, postpone some of the impact of the deteriorating employment markets for those earning Ph.D.'s. Eventually the shortage of attractive employment opportunities may discourage some of the most capable students from pursuing doctoral training in the biomedical and behavioral sciences, especially if there are more promising career opportunities available in other areas.

Research in the clinical fields is generally performed in medical and other health professions schools by persons with professional doctorates who have had some research training. Although the precise size of this pool is not known, there is some evidence that it is shrinking. According to data from the American Medical Association, the number of physicians involved primarily in research-related activities has decreased significantly since 1968. NIH-supported research training at the postprofessional level also has been declining. On the demand side, medical school faculties have been expanding at more than 6 percent annually, with no indication of decelerating. While some of these additional faculty positions may be filled by persons with Ph.D.'s, the Committee is concerned by the apparent decline in the research involvement of professonal doctorate-holders. As emphasized in Chapter 2, the M.D. researcher, with his knowledge of the diseases of man, plays an important role in extending the fundamental research of the basic scientist to the area of clinical medicine.

The rapidly growing need for health services research personnel, although not easily measured because of the small size of the field and its interdisciplinary nature, is reflected by the sharp rise in federal R and D expenditures in this area during the past several years. Other factors, including increases in graduate enrollments (in selected disciplines) and federal expenditures on health care delivery, also have contributed to the expansion in research activity in this area. However, little information is available on the number of persons qualified to work in health services research. These persons come from a variety of disciplines and may hold either a professional or academic doctorate. Despite the lack of more precise data, the Committee is convinced that continued support of graduate students through training programs is needed to provide an adequate number of qualified researchers in the health services area to meet the rapidly growing demand.

FOOTNOTES

1. In adopting this approach, academic doctorate-holders employed in the clinical sciences have been considered part of the biomedical supply, and M.D. researchers working in the basic science departments of medical schools have been counted with the clinical personnel. Any fluctuations in the availability of these small groups should have minimal impact on the aggregate supply estimates of biomedical and clinical scientists.

2. For a more detailed consideration of the limitations of projection methodology, see Richard B. Freeman and David W. Breneman, Forecasting the Ph.D. Labor Market: Pitfalls for Policy, National Board on Graduate Education, Washington, D.C., 1974.

3. U.S. Department of Labor, Bureau of Labor Statistics, Ph.D. Manpower: Employment Demand and Supply 1972-85, Bulletin 1860, Washington, D.C., U.S. Government Printing Office, 1975; and National Science Foundation, Projections of Science and Engineering Doctorate Supply and Utilization 1980 and 1985, NSF 75-301, Washington, D.C., U.S. Government Printing Office, 1975.

4. The life sciences and social sciences dealt with in these studies include much broader aggregations of fields than the biomedical and behavioral disciplines under consideration by the Committee, and consequently the findings may not be applicable.

5. The Committee felt that the detailed findings should not be released until the analysis has been completed, and hence only a summary of preliminary results is included in this report.

6. The difficulty for an academician to distinguish between time devoted to research and to teaching raises some doubt about the validity of work activity data.

7. The unemployment rates for subfields, including zoology, should be regarded with some caution, since they are based on a 20 percent sample and are subject to considerable variation.

8. Preliminary analysis of the growth of the biomedical and behavioral labor forces between 1960 and 1972 indicates that field switching and migration have had little net effect on the growth of the total Ph.D. labor force. Although the more experienced Ph.D. scientists who had been working in the biomedical and behavioral area have left their research positions, most have moved into administrative and teaching

positions in these fields. Hence, the size of the total Ph.D. labor force was not reduced.

9. This ratio is influenced by the numbers of master degree candidates in the graduate student population, as well as by the completion rates in doctoral programs.

10. Unfortunately, comparable data on research expenditures outside the academic sector were not available.

11. All Ph.D.-holders employed in academia who designated research as their primary or secondary work activity were included as academic researchers.

12. U.S. Department of Health, Education, and Welfare, Office of Education, Projections of Educational Statistics to 1983-84, Washington, D.C., U.S. Government Printing Office, 1974.

13. U.S. Department of Labor, op. cit., p. 4.

14. The significance of data on the field mobility of biomedical and behavioral Ph.D. scientists, however, is confounded by the fact that the markets in other potential employment areas have also declined in recent years.

15. Data from National Research Council, 1973 Survey of Doctoral Scientists and Engineers.

16. For the purposes of this analysis, all persons with Ph.D.'s who designated research as their primary or secondary work activity were included as researchers.

17. Although it is not possible to determine from existing data to what extent this replacement phenomenon has been occurring, there is some evidence that the proportion of the total academic work force who hold Ph.D.'s has been increasing.

18. American Medical Association, Center for Health Services Research and Development, Distribution of Physicians in the U.S., Chicago, Ill. (annual).

19. This equation was derived empirically by fitting the linear function

$$(CF/M)_i = a + b\,(MR\&D)_{i-k}$$

to the data to find the best-fitting value of the lag factor k. The best fit was obtained with k = 0. The computed values for the parameters a and b are shown above and in

Table 3.5. The average percentage deviation of the predicted from the actual value is 3.4 percent.

20. American Medical Association, op. cit.

21. Data from National Research Council, 1973 Survey of Doctoral Scientists and Engineers.

22. President's Science Advisory Committee, Improving Health through Research and Development. A report of the Panel on Health Services Research and Development of the President's Science Advisory Committee, Office of Science and Technology, Executive Office of the President, Washington, D.C., U.S. Government Printing Office, March 1972.

23. The higher estimate was made in 1972 by the Panel on Health Services Research and Development of the President's Science Advisory Committee (op. cit., p. 32). The lower estimate was made recently by our Panel on Health Services Research, who also feel that it is reasonable to assume that less than half the required number are currently available.

24. U.S. Department of Labor, op. cit., and National Science Foundation, op. cit.

25. The annual number of Ph.D.'s awarded in the biomedical sciences has fallen below the peak of about 4,000 recipients in 1971.

4. FUTURE DIRECTIONS

The National Research Service Award Act of 1974 specifies certain issues that should be addressed in the study of national needs for biomedical and behavioral research personnel (see Appendix V). These issues and the Committee's continuing efforts to respond to them were discussed in Chapter 1. This chapter will be concerned with several important questions that emerge from the legislative history of the Act. The Committee believes that these questions and others that concern the effectiveness and overall impact both of the provisions of the Act and of the guidelines used by the agencies to administer the program must be specifically addressed. They include the following:

1. Does a significant proportion of the students trained in these programs subsequently pursue careers in areas other than biomedical and behavioral research (and teaching)?
2. Are there alternative federal support programs available to students planning research careers in these fields?
3. Are there more appropriate and effective alternatives to the training grant and fellowship mechanisms?
4. Is it inequitable for the federal government to provide more support for graduate students in the biomedical and behavioral sciences than in many other fields?
5. Do individuals trained in NIH- and ADAMHA-supported programs subsequently earn incomes that make it reasonable to require them to bear the costs of their own training?
6. Should NIH and ADAMHA provide support for only those unable to pay for their own training?

The Committee has attempted to address several of the issues and questions raised in the National Research Service Award Act of 1974, primarily relying on data that have already been collected and on the expert judgment of its panels. Although all the available data have not been fully exploited, it is felt that at this stage important limitations in the data resources have been identified and that additional information now is needed to explore adequately these issues and questions. The Committee has specified four areas that will require special attention.

DEFINITION OF RESEARCH POPULATION

One area is to define and identify more precisely the research component of the total population of biomedical and behavioral scientists. In the market analysis described in Chapter 3, it was not possible, for example, to identify the subset of Ph.D. scientists employed in health-related research positions. Consequently, included in these analyses were hydrologists, clinical psychologists, and other groups, of which probably only a small fraction were working in areas covered by this statute.

The problems associated with the identification of appropriate research populations in both the clinical sciences and the health services fields are even more demanding. At this time the Committee has very little information about the number of M.D. researchers not on medical school faculties and virtually no reliable data about the number of health services research personnel. The lack of information about the latter group is, in part, due to the fact that health services research is a rapidly growing applied area in which nearly all of its participants received training in conventional biomedical and behavioral disciplines, health care administration, relevant quantitative areas, etc.

REFINEMENT OF SUPPLY/DEMAND ANALYSES

A second area requiring special study is that of elaborating and refining the supply/demand analyses presented in Chapter 3. In these and other market analyses, the methodology used places emphasis on the trends of major factors affecting supply and demand, without adequately taking into consideration the dynamics of the total market situation. As pointed out in Chapter 3, if current trends indicate a potentially significant imbalance in supply and demand, some market adjustments quite likely will occur to minimize the number of either unfilled vacancies or unemployed personnel. These adjustments often affect the utilization patterns of personnel already trained. In a projected oversupply situation many individuals, especially those just entering the labor force, may be forced to accept employment positions that do not fully utilize their training. Unfortunately, there is very little information on the extent to which this underutilization already has occurred in areas that are the concern of the Committee. For example, in the analyses of the markets for Ph.D. scientists in the biomedical and behavioral fields, some attention was given to the moderate decline in the proportion of this population involved in research activities.

In summary, the Committee recognizes the need to investigate changes in utilization patterns of biomedical and behavioral scientists in order to develop more precise

measures of underutilization and to study special markets, such as those for clinical and health services researchers. Such studies, in conjunction with those described above, will provide the foundation for making future assessments of the sizes and kinds of markets for selected subgroups.

PERSONNEL NEEDS IN SPECIALTY AREAS

A third area requiring special attention is the set of criteria and bases employed to differentiate among the personnel needs in the various specialty areas within the biomedical and behavioral science fields. At present the Committee recognizes that reliable criteria are not available on which to base such differentiation. It is evident from the data available on the utilization of Ph.D. scientists in the biomedical and behavioral disciplines that, although many differences do exist, there is a great amount of mobility among disciplines. In many cases, shortage areas may absorb the surpluses from other areas. Thus, the Committee fully recognizes the desirability and need of establishing appropriate criteria and will attempt to develop such. In order to do so, however, it will be necessary to establish two separate taxonomies--one describing research areas and the other describing training fields. By classifying individuals according to each taxonomy, transfer matrices can be developed to describe the movement from fields of training to research areas, a prerequisite to identifying the training areas that produce the personnel needed for various priority areas of research.

ALTERNATIVE SUPPORT MECHANISMS

A fourth area needing special study concerns the availability and merits of alternative support mechanisms. While some data on the distribution of graduate student support and on recent changes in this distribution were discussed in Chapter 2, there presently is little evidence concerning the advantages of one particular support mechanism over another. For the purpose of addressing the following questions, the Committee will need to obtain much factual information on the available sources and types of support for graduate students:

1. What role do the federally supported training programs play? Do they attract more students into biomedical and behavioral research? Do they enhance the caliber of research personnel?

2. What alternative mechanisms are there to the present NRSA program and what are their advantages and disadvantages?

In addition to the above points, the Committee and its panels already have given considerable attention to the appropriate mix of predoctoral and postdoctoral support, as well as to the most desirable balance between training grants and fellowships within the four broad fields, and have recommended that some changes be made. The Committee will monitor the impact of changes that are made as the result of these recommendations and recommend further adjustments as indicated.

Finally, the Committee recognizes the importance of maintaining and enhancing the quality of research scientists produced. There is a great need to assure that high-quality training is provided. To this end, the Committee will endeavor to study various aspects bearing on training quality, including the merits of alternative modes of support, the future success of trainees, the needs for and role of women and minorities in the biomedical and behavioral sciences, the needs for mid-career research training, and the importance of an institutional support component above and beyond student support.

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LIST OF ABBREVIATIONS IN THE APPENDIXES

ADAMHA	Alcohol, Drug Abuse, and Mental Health Administration
DRR	Division of Research Resources
FY	Fiscal Year
HEW	Department of Health, Education, and Welfare
HRA	Health Resources Administration
NCI	National Cancer Institute
NEI	National Eye Institute
NHLI	National Heart and Lung Institute
NIA	National Institute of Aging
NIAAA	National Institute on Alcohol Abuse and Alcoholism
NIAID	National Institute of Allergy and Infectious Diseases
NIAMDD	National Institute of Arthritis, Metabolism, and Digestive Diseases
NICHD	National Institute of Child Health and Human Development
NIDA	National Institute on Drug Abuse
NIDR	National Institute of Dental Research
NIEHS	National Institute of Environmental Health Science
NIGMS	National Institute of General Medical Sciences
NIH	National Institutes of Health
NIMH	National Institute of Mental Health
NINCDS	National Institute of Neurological and Communicative Disorders and Stroke
NLM	National Library of Medicine
NRSA	National Research Service Award (also cited as Act)
PHS	Public Health Service
PL 93-348	Public Law 93-348 (National Research Act of 1974)
R and D	Research and Development
WPF	Weinberger Postdoctoral Fellowships

APPENDIX I

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APPENDIX II

SUPPLEMENTARY TABLES

TABLE II.1 Estimated Number of NIH and ADAMHA Trainees and Fellows by Aggregate Field, Academic Level, and Fiscal Year of Award

			Basic Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
			Pre[a]	Post[b]	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
FY 1975[c]	NIH	Trainees	5630	1686	7316	587	49	636	485[c]	1998	2483	19	11	30	6721	3744	10465
		Fellows	22	1318	1340	—	25	25	—	554	554	—	—	—	22	1897	1919
		Total	5652	3004	8656	587	74	661	485[c]	2552	3037	19	11	30	6743	5941	12384
	ADAMHA	Trainees	254	95	349	982	39	1021	—	—	—	95	25	120	1331	159	1490
		Fellows	155	97	252	185	99	284	—	—	—	18	15	33	358	211	569
		Total	409	192	601	1167	138	1305	—	—	—	113	40	153	1689	370	2059
	Total NIH & ADAMHA	Trainees	5884	1781	7665	1569	88	1657	485[c]	1998	2483	114	36	150	8052	3903	11955
		Fellows	177	1415	1592	185	124	309	-	554	554	18	15	33	380	2108	2488
		Total	6061	3196	9257	1754	212	1966	485[c]	2552	3037	132	51	183	8432	6011	14443
FY 1976	NIH & ADAMHA	Trainees	5240	1280	6520	1350	155	1505	581	2050	2631	115	35	150	7286	3520	10806
		Fellows	160	1920	2080	150	205	355	—	625	625	20	15	35	330	2765	3095
		Total	5400	3200	8600	1500	360	1860	581	2675	3256	135	50	185	7616	6285	13901
FY 1977	NIH & ADAMHA	Trainees	5240	1280	6520	1080	330	1410	600	2100	2700	115	35	150	7035	3745	10780
		Fellows	160	1920	2080	120	210	330	—	700	700	20	15	35	300	2845	3145
		Total	5400	3200	8600	1200	540	1740	600	2800	3400	135	50	185	7335	6590	13925
FY 1978	NIH & ADAMHA	Trainees	5240	1280	6520	750	550	1300	600	2100	2700	115	35	150	6705	3965	10670
		Fellows	160	1920	2080	100	190	290	—	700	700	20	15	35	280	2825	3105
		Total	5400	3200	8600	850	740	1590	600	2800	3400	135	50	185	6985	6790	13775

[a]Pre-Ph.D. or Pre-M.D.

[b]Post-Ph.D. or Post-M.D.

[c]In developing its recommendations the Committee has elected to include these predoctorals within the Basic Biomedical Sciences (see the introductory section of Appendix IV and Table 1.1).

ASSUMPTIONS: The numbers of trainees and fellows in each field were based on the Committee's recommendation for total predoctoral and postdoctoral awards and were calculated according to the following assumptions:

Basic Biomedical Sciences — The FY 1975 distribution of predoctorals was maintained through FY 1978 (approximately 97 percent of predoctorals on training grants, 3 percent on fellowships). For purposes of estimating cost, it is assumed that postdoctorals change from approximately 60 percent on training grants in FY 1975 to 60 percent on fellowships in FY 1976-78. This is in accordance with the Committee's recommendation to emphasize fellowships over training grants for postdoctorals in the basic biomedical sciences.

Behavioral Sciences — The FY 1975 distribution of predoctorals was maintained through FY 1978 (approximately 90 percent on training grants, 10 percent on fellowships). Postdoctorals change from 42 percent on training grants in FY 1975 to 58 percent on training grants in FY 1978 in accordance with the Committee's recommendation to emphasize training grants over fellowships in the behavioral sciences.

Clinical Sciences — All predoctorals are on training grants. Postdoctoral fellowships gradually increase to about 20 percent of the total in FY 1978 in accordance with the Committee's recommendation in the clinical sciences.

Health Services Research — The FY 1975 distributions are maintained through FY 1978 (85 percent of predoctorals on training grants, 15 percent on fellowships; 70 percent of postdoctorals on training grants, 30 percent on fellowships).

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976.

TABLE II.2 Primary Source of Support for Full-time Graduate Students in the Biomedical and Behavioral Sciences, 1972 and 1974

	Biomedical Sciences					Behavioral Sciences					All Sciences				
	1972		1974		Change 1972-74	1972		1974		Change 1972-74	1972		1974		Change 1972-74
	(N)	(%)	(N)	(%)	(%)	(N)	(%)	(N)	(%)	(%)	(N)	(%)	(N)	(%)	(%)
TOTAL	25205	100.0	26663	100.0	5.8	24884	100.0	25904	100.0	4.1	147060	100.0	149064	100.0	1.4
Total Federal	8998	35.7	7770	29.1	-13.6	6609	26.6	5412	20.9	-18.1	42646	29.0	35336	23.7	-17.1
DOD	41	0.2	118	0.4	a	98	0.4	218	0.8	122.4	4570	3.1	4670	3.1	2.2
NIH	5736	22.8	5244	19.7	-8.6	3581	14.4	1753	6.8	-51.0	12119	8.2	9020	6.1	-25.6
Other HEW	749	3.0	369	1.4	-50.7	1057	4.2	1995	7.7	88.7	4278	2.9	3305	2.2	-22.7
NSF	1063	4.2	759	2.8	-28.6	756	3.0	520	2.0	-31.2	9995	6.8	7882	5.3	-21.1
Other	1409	5.6	1280	4.8	-9.2	1117	4.5	926	3.6	-17.2	11684	7.9	10459	7.0	-10.5
Total Nonfederal	16207	64.3	18893	70.9	16.6	18275	73.4	20492	79.1	12.1	104414	71.0	113728	76.3	8.9
Institutional	9758	38.7	11414	42.8	17.0	8898	35.8	10057	38.8	13.0	57932	39.4	63060	42.3	8.9
Self	4785	19.0	5736	21.5	19.9	7670	30.8	8819	34.0	15.0	34714	23.6	37857	25.4	9.1
Other U.S.	1240	4.9	1261	4.7	1.7	1518	6.1	1454	5.6	-4.2	8713	5.9	9159	6.1	5.1
Foreign	424	1.7	482	1.8	13.7	189	.8	162	.6	-14.3	3055	2.1	3652	2.4	19.5

[a]Base less than 50.

NOTE: Data include persons enrolled in only those departments which responded to all three (1972-74) surveys and hence do not represent population figures.

SOURCE: National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1972-74.

TABLE II.3 Primary Source of Support by Type of Support for Full-time Graduate Students in the Biomedical and Behavioral Sciences, 1974

All sciences	HEW		Other Federal		Institution		Self		Other	
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
TOTAL	12,325	100.0	23,011	100.0	63,060	100.0	37,857	100.0	12,811	100.0
Fellow/Trainee	8,366	67.9	4,126	17.9	8,865	14.1	—	—	5,287	41.3
Research Assist.	3,591	29.1	15,559	67.8	10,744	17.0	—	—	3,567	27.8
Teaching Assist.	132	1.1	205	.9	39,344	62.4	—	—	361	2.8
Other Types	236	1.9	3,081	13.4	4,107	6.5	37,857	100.0	3,596	28.1
Biomedical sciences										
TOTAL	5,613	100.0	2,157	100.0	11,414	100.0	5,736	100.0	1,743	100.0
Fellow/Trainee	3,972	70.8	536	24.8	1,522	13.3	—	—	662	38.0
Research Assist.	1,463	26.1	1,382	64.1	2,001	17.5	—	—	589	33.8
Teaching Assist.	73	1.3	46	2.1	7,237	63.4	—	—	20	1.1
Other Types	105	1.9	193	9.0	654	5.7	5,736	100.0	472	27.1
Behavioral sciences										
TOTAL	3,748	100.0	1,664	100.0	10,057	100.0	8,819	100.0	1,616	100.0
Fellow/Trainee	2,980	79.5	784	47.1	1,695	16.9	—	—	646	40.0
Research Assist.	668	17.8	548	32.9	1,439	14.3	—	—	335	20.7
Teaching Assist.	31	0.8	24	1.5	5,780	57.5	—	—	69	4.3
Other Types	69	1.8	308	18.5	1,143	11.4	8,819	100.0	566	35.0

NOTE: Data include persons enrolled in only those departments which responded to all three (1972-74) surveys and hence do not represent population figures.

SOURCE: National Science Foundation, Graduate Science Student Support and Postdoctorals Survey, 1974.

TABLE II.4 Total R and D Expenditures Compared with the Size of the Ph.D. Research Pool in Academia in the Biomedical and Behavioral Sciences, 1960-73 (1967 constant dollars)

	Biomedical Sciences			Behavioral Sciences		
Year	R and D in Academia ($ thousands)	Academic Research Pool[a] (N)	Ratio[b]	R and D in Academia ($ thousands)	Academic Research Pool[a] (N)	Ratio[b]
1960	430,132			29,303		
1961	495,719			33,758		
1962	569,381	10,817	52.6	38,773	3,121	12.4
1963	662,190			45,093		
1964	759,013	12,994	58.4	51,857	5,225	9.9
1965	829,224			56,528		
1966	909,611	14,958	60.8	62,714	6,449	9.7
1967	951,856			77,417		
1968	989,533	18,439	53.7	93,390	8,661	10.8
1969	1,004,689			89,304		
1970	1,029,525	22,008	46.8	89,339	10,295	8.7
1971	1,037,347			94,592		
1972	1,039,662	26,490	39.2	99,827	13,620	7.3
1973	1,122,239			99,844		

[a]Included in this pool are all Ph.D. scientists employed in educational institutions who were engaged in biomedical/behavioral research as a primary or secondary work activity.

[b]Total R and D expenditures in academia divided by size of academic research pool.

SOURCES: National Science Foundation, Expenditures for Scientific and Engineering Activities at Universities and Colleges, FY 1974, Washington, D. C.: U. S. Government Printing Office, 1975; and National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

TABLE II.5 Total Graduate and Undergraduate Enrollments Compared with the Size of the Academic Sector of the Ph.D. Market in the Biomedical and Behavioral Sciences

	Biomedical Sciences			Behavioral Sciences		
Year	Total Enrollments[a]	Academic Labor Force[b]	Ratio[c]	Total Enrollments[a]	Academic Labor Force[b]	Ratio[c]
1960	250,265	10,943	22.9	166,452	4,807	34.6
1961	274,582			175,312		
1962	299,540	12,206	24.5	203,570	5,488	37.1
1963	326,095			230,931		
1964	351,842	15,089	23.3	275,025	8,381	32.8
1965	382,293			323,446		
1966	415,150	17,186	24.2	391,563	10,034	39.0
1967	428,842			441,998		
1968	457,667	21,561	21.2	507,763	13,288	38.2
1969	483,142			580,410		
1970	532,530	25,765	20.7	652,580	16,642	39.2
1971	564,660			690,333		
1972	592,798	31,306	18.9	724,942	20,507	35.4
1973	626,227			755,299		

[a]Included are both full-time graduate and undergraduate enrollments.

[b]Included are all Ph.D. scientists employed in educational institutions in the biomedical/behavioral sciences.

[c]Total enrollments divided by academic labor force size.

SOURCES: U.S. Department of Health, Education, and Welfare, Office of Education, Projections of Educational Statistics, Washington, D. C.: U.S. Government Printing Office, 1970, 1971, 1974; and National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

TABLE II.6 Proportion of U.S. Ph.D. Recipients in the Biomedical and Behavioral Sciences with Definite Employment Commitments at the Time of Graduation, 1958-73

	Biomedical Sciences		Behavioral Sciences	
Year of Ph.D.	Total (N)	Definite Commitment (%)	Total (N)	Definite Commitment (%)
1958	1283	77.0	954	74.2
1959	1239	81.2	1024	81.4
1960	1315	82.1	1003	82.0
1961	1345	83.9	1042	81.0
1962	1505	83.0	1121	81.4
1963	1616	83.5	1184	81.2
1964	1844	83.5	1297	82.0
1965	2108	83.3	1275	83.8
1966	2309	83.4	1496	82.3
1967	2537	82.9	1788	83.8
1968	3020	82.2	1991	81.9
1969	3353	75.7	2444	78.0
1970	3702	77.9	2730	78.2
1971	4067	72.9	3082	78.3
1972	3987	72.1	3246	74.7
1973	4022	72.1	3431	73.3

SOURCE: National Research Council, Survey of Earned Doctorates, 1958-73.

TABLE II.7 Proportion of U.S. Ph.D. Recipients in the Biomedical and Behavioral Sciences Planning Postdoctoral Study, 1958-73

	Biomedical Sciences		Behavioral Sciences	
Year of Ph.D.	Total (N)	Planning Postdoctoral Study (%)	Total (N)	Planning Postdoctoral Study (%)
1958	1283	10.6	954	3.8
1959	1239	13.6	1024	5.1
1960	1315	19.5	1003	7.6
1961	1345	25.6	1042	7.6
1962	1505	27.6	1121	9.0
1963	1616	27.0	1184	9.2
1964	1844	28.7	1297	8.9
1965	2108	30.6	1275	11.1
1966	2309	31.3	1496	10.8
1967	2537	32.6	1788	10.3
1968	3020	34.7	1991	9.5
1969	3353	41.3	2444	11.1
1970	3702	44.1	2730	11.0
1971	4067	43.5	3082	10.8
1972	3987	44.9	3246	10.1
1973	4022	45.5	3431	10.7

SOURCE: National Research Council, Survey of Earned Doctorates, 1958-73.

TABLE II.8 Employment Sector Distribution of Entrants[a] to the Ph.D. Labor Forces[b] in the Biomedical and Behavioral Sciences, 1960-72

Biomedical Sciences					
Year of Entry	Labor Force (%)	Employment Sector			
		Academia (%)	Business (%)	Government (%)	Other (%)
1960	100.0	61.6	12.9	13.0	12.5
1962	100.0	59.1	12.6	16.7	11.7
1964	100.0	65.0	10.3	13.3	11.5
1966	100.0	67.5	9.3	13.6	9.6
1968	100.0	68.3	8.3	13.0	10.3
1970	100.0	68.6	7.9	12.1	11.4
1972	100.0	72.2	5.9	8.9	13.0

Behavioral Sciences					
Year of Entry	Labor Force (%)	Employment Sector			
		Academia (%)	Business (%)	Government (%)	Other (%)
1960	100.0	43.8	8.4	12.6	35.2
1962	100.0	44.2	5.5	13.9	36.4
1964	100.0	60.6	4.3	9.9	25.2
1966	100.0	61.8	4.1	6.1	28.0
1968	100.0	67.4	3.2	6.5	22.9
1970	100.0	67.7	3.2	5.5	23.6
1972	100.0	65.1	2.7	3.6	28.6

[a]Includes persons receiving Ph.D.'s during the two year period prior to the year of entry (e.g., 1958-59 Ph.D. recipients are considered entrants to the 1960 labor force).

[b]Persons are classified according to employment field, not field of doctorate.

SOURCES: National Science Foundation, National Register of Scientific and Technical Personnel, 1960-70; National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

TABLE II.9 Work Activity Distribution of Entrants[a] to the Ph.D. Labor Forces[b] in the Biomedical and Behavioral Sciences, 1960-72

Biomedical Sciences								
Year of Entry	Labor Force (%)	Total Research (%)	Research				Non-Research	
			Basic (%)	Applied (%)	Mgmt. (%)	Secondary Activity (%)	Teaching (%)	Other (%)
1960	100.0	95.3	53.2	14.7	3.7	23.7	2.7	1.9
1962	100.0	94.1	52.1	14.0	3.7	24.3	4.7	1.2
1964	100.0	92.6	54.4	11.7	2.9	23.6	4.3	3.1
1966	100.0	92.1	56.8	9.7	3.5	22.0	3.7	4.3
1968	100.0	92.8	54.3	10.9	2.8	24.9	3.7	3.6
1970	100.0	91.8	52.7	11.3	3.2	25.5	4.2	4.0
1972	100.0	88.0	47.3	12.7	5.5	22.6	7.7	4.3

Behavioral Sciences								
Year of Entry	Labor Force (%)	Total Research (%)	Research				Non-Research	
			Basic (%)	Applied (%)	Mgmt. (%)	Secondary Activity (%)	Teaching (%)	Other (%)
1960	100.0	51.7	12.0	13.1	3.7	23.0	10.0	38.3
1962	100.0	53.9	14.5	10.2	4.0	25.2	9.9	36.2
1964	100.0	61.8	16.5	9.6	4.7	31.0	12.5	25.7
1966	100.0	68.0	14.3	12.4	4.5	36.8	12.2	19.8
1968	100.0	63.1	13.8	9.5	4.9	34.8	10.5	26.4
1970	100.0	60.8	11.5	7.9	4.0	37.4	12.6	26.5
1972	100.0	60.6	9.0	6.8	5.1	39.6	12.6	26.8

[a]Includes persons receiving Ph.D.'s during the two year period prior to the year of entry (e.g., 1958-59 Ph.D. recipients are considered entrants to the 1960 labor force).

[b]Persons are classified according to employment field, not field of doctorate.

SOURCES: National Science Foundation, National Register of Scientific and Technical Personnel, 1960-70; National Research Council, Survey of Doctoral Scientists and Engineers, 1973.

TABLE II.10 Funding Levels of NIH and ADAMHA Research Training Programs, FY 1975, by Institute, Aggregate Field, and Mechanism of Support[a]

(millions of dollars)

Agency	Institute	Basic Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		TG[b]	F[c]	Total	TG	F	Total	TG	F	Total	TG	F	Total	TG	F	Total
		($ millions)			($ millions)			($ millions)			($ millions)			($ millions)		
NIH	NIA	0.74	0.15	0.88	1.07	0.05	1.13	--	--	--	--	--	--	1.81	0.20	2.01
	NIAID	3.65	2.09	5.74	--	--	--	2.61	0.25	2.85	--	--	--	6.26	2.34	8.60
	NIAMDD	0.71	0.28	0.99	--	--	--	10.02	2.43	12.45	--	--	--	10.73	2.71	13.44
	NCI	5.25	1.79	7.04	--	--	--	8.57	2.90	11.47	--	--	--	13.83	4.69	18.52
	NICHD	3.46	1.28	4.74	2.78	0.28	3.06	1.97	0.16	2.14	--	--	--	8.21	1.72	9.93
	NIDR	3.69	0.62	4.31	--	--	--	1.42	--	1.42	--	--	--	5.11	0.62	5.74
	NIEHS	2.90	0.39	3.29	--	--	--	--	--	--	--	--	--	2.90	0.39	3.29
	NEI	2.12	0.90	3.02	--	--	--	1.19	0.12	1.31	--	--	--	3.32	1.01	4.33
	NIGMS	39.58	4.67	44.25	2.34	--	2.34	5.75	0.19	5.94	--	--	--	47.67	4.85	52.52
	NHLI	8.28	1.62	9.90	--	0.005	0.005	8.33	1.07	9.40	--	--	--	16.61	2.69	19.30
	NINCDS	2.77	2.31	5.08	--	--	--	8.21	0.22	8.43	--	--	--	10.98	2.52	13.51
	DRR + NLM	--	--	--	0.12	--	0.12	8.39	0.05	4.33	0.48	--	0.48	0.99	0.05	1.04
	Total	73.16	16.09	89.24	6.30	0.34	6.64	48.46	7.37	55.83	0.48	--	0.48	128.40	23.80	152.20
ADAMHA	NIMH	3.65	2.36	6.02	8.39	2.83	11.22	--	--	--	1.09	0.24	1.33	13.14	5.43	18.56
	NIDA	--	0.32	0.32	--	0.11	0.11	--	--	--	--	--	--	--	0.43	0.43
	NIAAA	0.15	0.07	0.22	0.14	0.07	0.21	--	--	--	0.14	0.07	0.21	0.44	0.21	0.64
	Total	3.80	2.75	6.55	8.54	3.00	11.54	--	--	--	1.24	0.31	1.54	13.57	6.06	19.63
Total NIH & ADAMHA		76.96	18.84	95.79	14.84	3.34	18.18	48.46	7.37	55.83	1.72	0.31	2.02	141.97	29.86	171.83

[a]Totals may not add up due to rounding.

[b]TG = Training Grants.

[c]F = Fellowships.

SOURCE: Data supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976.

TABLE II.11 Health Services Research Training Programs of the National Center for Health Services Research (HRA)

Fiscal Year of Award	Training Grants		Fellowships	Total Trainee and Fellowship Awards
	Programs (N)	Slots Permitted (N)	(N)	(N)
1967	15	85	22	107
1968	16	105	31	136
1969	21	152	32	187
1970	50	267	61	328
1971	51	330	82	412
1972	49	347	90	437
1973	44	327	50	377
1974	40	348	35[a]	383
1975	36	212[a]	11	223
1976 (est.)	20	110	4	114

[a]No new fellowships were awarded after FY 1973 and no training grants after FY 1974; the numbers shown for subsequent years represent continuing commitments.

SOURCE: National Center for Health Services Research, Office of Grants Administration.

APPENDIX III

NIH AND ADAMHA COMMITMENTS IN FY 1976 AND FY 1977 BY INITIAL TRAINING AUTHORITY

In FY 1975, NIH and ADAMHA supported the research training of approximately 9,000 biomedical scientists, 3,000 clinical scientists, 1,900 behavioral scientists, and 200 scientists in health services research.[1] Since FY 1975 marked the beginning of the NRSA program, but not the termination of support of trainees from previous research training programs of the agencies, the total number of awards in FY 1975 represents a composite of three types of trainees: (1) those who began their research training under the traditional authorities (PHS program) in FY 1974 and earlier and were continued in FY 1975, (2) those who began under the Weinberger Postdoctoral Research Fellowship program initiated in FY 1974 (WPF program) and were continued in FY 1975, and (3) those who began under the new NRSA program in FY 1975.

In the tables and graphs that follow data provided by the agencies show the number of existing research traineeship and fellowship commitments for FY 1976 and FY 1977, as well as the awards made in FY 1975.

PREDOCTORAL AND POSTDOCTORAL RESEARCH TRAINING

Table III.1 presents the distribution of predoctoral and postdoctoral trainees and fellows for each aggregate field in FY 1975 and the estimated commitments in FY 1976 and FY 1977. Figure III.1 shows the predoctoral and postdoctoral awards and future commitments for each agency. As can be seen, fewer postdoctoral trainees and fellows were supported than predoctorals through awards granted by both NIH and ADAMHA in FY 1975. This relation holds with respect to the estimated commitments in succeeding fiscal years.

Table III.2 shows the distribution of predoctoral and postdoctoral awards in FY 1975, as well as the estimated number of commitments in FY 1976 and FY 1977, by aggregate field and initial training authority. As these figures illustrate, the bulk of research training at both the predoctoral and postdoctoral levels in FY 1975 may be accounted for by continuations supported initially through

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1. See the Glossary for the disciplines comprising these broad fields of research training. In the areas of mental health, drug abuse and alcoholism, clinical investigation is a multidisciplinary activity and not appropriately classified as "clinical sciences." Clinical investigators in these areas use various mixtures of techniques and concepts from biological, psychological, and social sciences.

the traditional research training programs (PHS). Tables III.3 through III.5 provide the distribution of these awards by aggregate field and initial training authority for each institute/division of NIH and ADAMHA for the 3 fiscal years.

RESEARCH TRAINEESHIPS AND FELLOWSHIPS

Table III.1 presents the distribution of research trainees and fellows for each aggregate field in FY 1975 and the estimated commitments in FY 1976 and FY 1977. Figure III.2 illustrates these data by awarding agency. It is seen that the number of fellows supported in FY 1975 by both NIH and ADAMHA is fewer than the number of trainees and that this relation holds for the estimated number of commitments of each agency in FY 1976 and FY 1977.

Table III.6 shows the distribution of all research traineeships and fellowships by both NIH and ADAMHA for FY 1975, together with estimated commitments for FY 1976 and FY 1977, by aggregate field and initial training authority. As these figures show, the bulk of research training funded in FY 1975 was for traineeships that had been started under training authorities that were in effect prior to passage of the NRSA Act, while the majority of FY 1975 fellowship awards were made through the NRSA authority. Tables III.7 through III.9 show the distribution of awards by initial training authority for each awarding institute/division of NIH and ADAMHA for fiscal years 1975 through 1977.

TABLE III.1 Research Traineeships and Fellowships Awarded in FY 1975, together with Estimated Agency Commitments for FY 1976 and FY 1977 by Aggregate Field and Academic Level

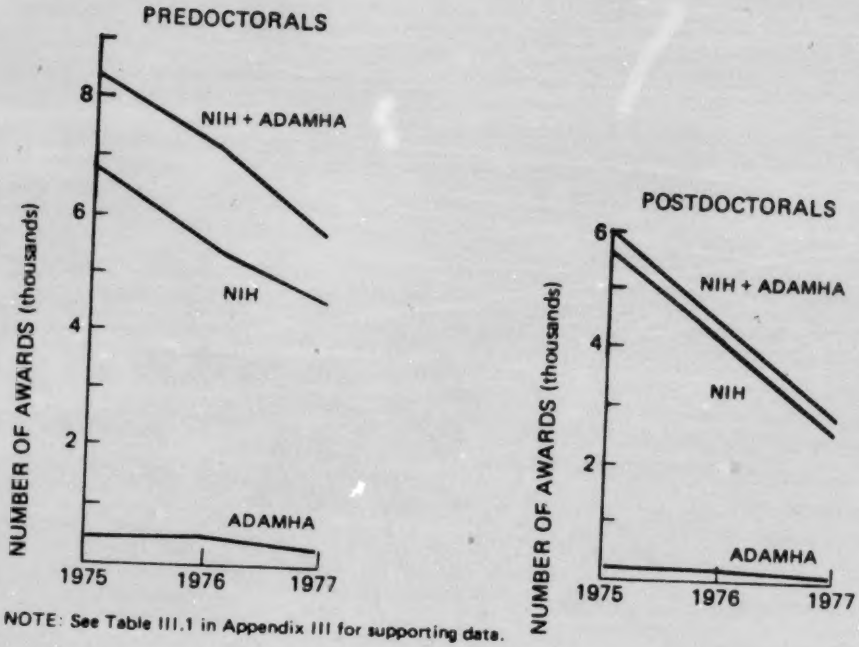
			Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
			Pre[a]	Post[b]	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
FY 1975	NIH	Trainees	5630	1686	7316	587	49	636	485[c]	1998	2483	19	11	30	6721	3744	10465
		Fellows	22	1318	1340	—	25	25	—	554	554	—	—	—	22	1897	1919
		Total	5652	3004	8656	587	74	661	485[c]	2552	3037	19	11	30	6743	5641	12384
	ADAMHA	Trainees	254	95	349	982	39	1021	—	—	—	95	25	120	1331	159	1490
		Fellows	155	97	252	185	99	284	—	—	—	18	15	33	358	211	569
		Total	409	192	601	1167	138	1305	—	—	—	113	40	153	1689	370	2059
	Total NIH & ADAMHA	Trainees	5884	1781	7665	1569	88	1657	485[c]	1998	2483	114	36	150	8052	3903	11955
		Fellows	177	1415	1592	185	124	309	-	554	554	18	15	33	380	2108	2488
		Total	6061	3196	9257	1754	212	1966	485[c]	2552	3037	132	51	183	8432	6011	14443
FY 1976	NIH	Trainees	4283	1466	5749	451	26	477	597	1413	2010	19	6	25	5350	2911	8261
		Fellows	12	807	819	—	24	24	—	382	382	—	—	—	12	1213	1225
		Total	4295	2273	6568	451	50	501	597	1795	2392	19	6	25	5362	4124	9486
	ADAMHA	Trainees	202	95	297	892	38	930	—	—	—	83	26	109	1177	159	1336
		Fellows	283	71	354	332	73	405	—	—	—	27	8	35	642	152	794
		Total	485	166	651	1224	111	1335	—	—	—	110	34	144	1819	311	2130
	Total NIH & ADAMHA	Trainees	4485	1561	6046	1343	64	1407	597	1413	2010	102	32	134	6527	3070	9597
		Fellows	295	878	1173	332	97	429	-	382	382	27	8	35	654	1365	2019
		Total	4780	2439	7219	1675	161	1836	597	1795	2392	129	40	169	7181	4435	11616
FY 1977	NIH	Trainees	3744	1051	4795	331	17	348	449	1077	1526	8	2	10	4532	2147	6679
		Fellows	5	272	277	—	4	4	-	181	181	—	—	—	5	457	462
		Total	3749	1323	5072	331	21	352	449	1258	1707	8	2	10	4537	2604	7141
	ADAMHA	Trainees	205	63	268	604	14	618	—	—	—	47	15	62	856	92	948
		Fellows	95	25	120	112	26	138	—	—	—	10	5	15	217	56	273
		Total	300	88	388	716	40	756	—	—	—	57	20	77	1073	148	1221
	Total NIH & ADAMHA	Trainees	3949	1114	5063	935	31	966	449	1077	1526	55	17	72	5388	2239	7627
		Fellows	100	297	397	112	30	142	—	181	181	10	5	15	222	513	735
		Total	4049	1411	5460	1047	61	1108	449	1258	1707	65	22	87	5610	2752	8362

[a]Pre-Ph.D. or Pre-M.D.

[b]Post-Ph.D. or Post-M.D.

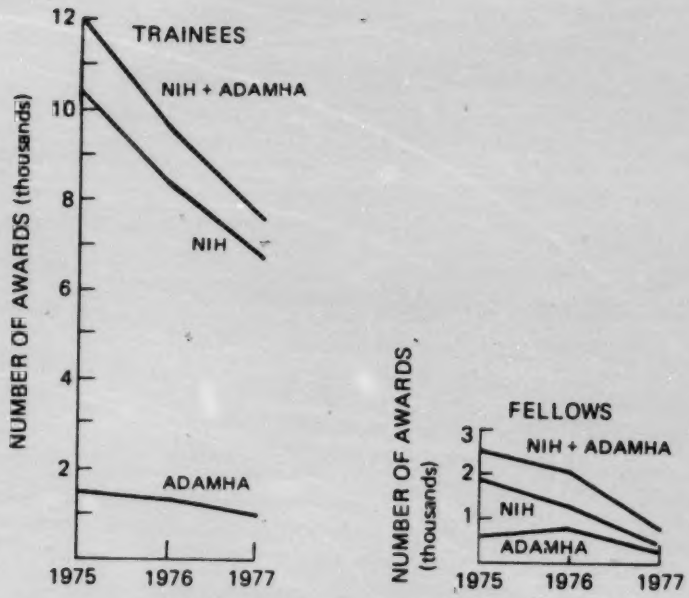
[c]In developing its recommendations the Committee has elected to include these predoctorals within the Basic Biomedical Sciences (see the introductory section of Appendix IV and Table 1.1).

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.



NOTE: See Table III.1 in Appendix III for supporting data.

FIGURE III. 1 Predoctoral and Postdoctoral Awards in FY 1975 together with Agency Commitments for FY 1976 and FY 1977 by Agency



NOTE: See Table III.1 in Appendix III for supporting data.

FIGURE III.2 Research Traineeships and Fellowships Awarded in FY 1975, together with Agency Commitments for FY 1976 and FY 1977 by Agency

TABLE III.2 NIH[a] Predoctoral and Postdoctoral Awards in FY 1975, together with Estimated Commitments for FY 1976 and FY 1977, by Aggregate Field and Category of Agency Training Program

FY		Biomedical				Behavioral				Clinical				HSR				Total			
		NRSA[b]	WPF[c]	PHS[d]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
1975	Pre	1000	—	4652	5652	16	—	571	587	195	2	288	485[e]	—	—	19	19	1211	2	5530	6743
	Post	1470	356	1178	3004	12	12	50	74	849	272	1431	2552	—	—	11	11	2331	640	2670	5641
	Total	2470	356	5830	8656	28	12	621	661	1044	274	1719	3037	—	—	30	30	3542	642	8200	12384
1976	Pre	1656	2	2637	4295	25	—	426	451	249	—	348	597	—	—	19	19	1930	2	3430	5362
	Post	1196	358	719	2273	11	13	26	50	887	246	662	1795	—	—	6	6	2094	617	1413	4124
	Total	2852	360	3356	6568	36	13	452	501	1136	246	1010	2392	—	—	25	25	4024	619	4843	9486
1977	Pre	2180	—	1569	3749	25	—	306	331	291	—	158	449	—	—	8	8	2496	—	2041	4537
	Post	950	40	333	1323	3	2	16	21	902	47	309	1258	—	—	2	2	1855	89	660	2604
	Total	3130	40	1902	5072	28	2	322	352	1193	47	467	1707	—	—	10	10	4351	89	2701	7141
TOTAL	Pre	4836	2	8858	13696	66	—	1303	1369	735	2	794	1531	—	—	46	46	5637	4	11001	16642
	Post	3616	754	2230	6600	26	27	92	145	2638	565	2402	5605	—	—	19	19	6280	1346	4743	12369
	Total	8452	756	11088	20296	92	27	1395	1514	3373	567	3196	7136	—	—	65	65	11917	1350	15744	29011

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.

[a]ADAMHA data were not available in sufficient detail to include in this table.

[b]These individuals were supported by awards made in the initial year of the NRSA program.

[c]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[d]These individuals received their awards initially under the individual research training programs of the PHS prior to FY 1974.

[e]In developing its recommendations the Committee has elected to include these predoctorals within the Basic Biomedical Sciences (see the introductory section of Appendix IV and Table 1.1).

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE III.3 Predoctoral and Postdoctoral Awards in FY 1975 by Aggregate Field, Initial Training Authority, and Awarding Institute

1975		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
		NRSA[a]	WPF[b]	PHS[c]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
NIH																					
NIAID	Pre			478	478						2		2						2	478	480
	Post	163	25	128	316					27	24	93	144					190	49	221	460
	Total	163	25	606	794					27	26	93	146					190	51	699	940
NIAMDD	Pre									2		8	10					2		8	10
	Post	27	6	21	54					195	59	301	555					222	65	322	609
	Total	27	6	21	54					197	59	309	565					224	65	330	619
NCI	Pre	95		74	169					155		120	275					250		194	444
	Post	226	47	96	369					369	77	156	602					595	124	252	971
	Total	321	47	170	538					524	77	276	877					845	124	446	1415
NICHD	Pre	19		199	218	16		258	274			20	20					35		477	512
	Post	66	25	87	178	12	7	12	31	16	7	80	103					94	39	179	312
	Total	85	25	286	396	28	7	270	305	16	7	100	123					129	39	656	824
NIDR	Pre	9		79	88			3	3			24	24					9		106	115
	Post	63	36	69	168					5	40	34	79					68	76	103	247
	Total	72	36	148	256			3	3	5	40	58	103					77	76	209	362
NIEHS	Pre	20		157	177													20		157	177
	Post	47	14	37	98													47	14	37	98
	Total	67	14	194	275													67	14	194	275
NEI	Pre	13		25	38					1		3	4					14		28	42
	Post	90	5	44	139					21		21	42					111	5	65	181
	Total	103	5	69	177					22		24	46					125	5	93	223
NIGMS	Pre	818		3451	4269			229	229			11	11					818		3691	4509
	Post	357	90	322	769			14	14	32	33	203	268					389	123	539	1051
	Total	1175	90	3773	5038			243	243	32	33	214	279					1207	123	4230	5560
NHLI	Pre	20		143	163					37		42	79					57		185	242
	Post	187	93	282	562		2		2	166	26	289	481					353	121	571	1045
	Total	207	93	425	725		2		2	203	26	331	560					410	121	756	1287
NINCDS	Pre	6			6							60	60					6		60	66
	Post	235	9	79	323					12	1	238	251					247	10	317	574
	Total	241	9	79	329					12	1	298	311					253	10	377	640
DRR & NLM	Pre							5	5							19	19			24	24
	Post							4	4	6	5	16	27			11	11	6	5	31	42
	Total							9	9	6	5	16	27			30	30	6	5	55	66
NIA	Pre			46	46			76	76											122	122
	Post	9	6	13	28		3	20	23									9	9	33	51
	Total	9	6	59	74		3	96	99									9	9	155	173
NIH Total	Pre	1000		4652	5654	16		571	587	195	2	288	485[e]			19	19	1211	2	5530	6743
	Post	1470	356	1178	3004	12	12	50	74	849	272	1431	2552			11	11	2331	640	2670	5641
	Total	2470	356	5830	8656	28	12	621	661	1044	274	1719	3037			30	30	3542	642	8200	12384
ADAMHA																					
NIAAA, NIDA & NIMH	Pre	d	d	d	409	d	d	d	1167					d	d	d	113	d	d	d	1689
	Post	d	d	d	192	d	d	d	138					d	d	d	40	d	d	d	370
	Total	d	d	d	601	d	d	d	1305					d	d	d	153	d	d	d	2059
NIH & ADAMHA	Pre				6061				1754				485[e]				132				8432
	Post				3196				212				2552				51				6011
	Total				9257				1966				3037				183				14443

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.

[a]These individuals were supported by awards in the initial year of the NRSA program.

[b]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c]These individuals received their awards initially under the individual research training programs of the PHS prior to FY 1974.

[d]Data are not available.

[e]In developing its recommendations the Committee has elected to include these predoctorals within the Basic Biomedical Sciences (see the introductory section of Appendix IV and Table 1.1).

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE III.4 Predoctoral and Postdoctoral Estimated Commitments in FY 1976 by Aggregate Field, Initial Training Authority, and Awarding Institute

1976		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
		NRSA[a]	WPF[b]	PHS[c]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
NIH																					
NIAID	Pre		2	140	142							196	196					0	2	336	338
	Post	32	20	63	115					54	26	86	166					86	46	149	281
	Total	32	22	203	257					54	26	282	362					86	48	485	619
NIAMDD	Pre									3		8	11					3		8	11
	Post	15	12		27					202	55		257					217	67		284
	Total	15	12		27					205	55	8	268					220	67	8	295
NCI	Pre	123		46	169					200		76	276					323		122	445
	Post	197	32	54	283					322	51	87	460					519	83	141	743
	Total	320	32	100	452					522	51	163	736					842	83	263	1188
NICHD	Pre	19		171	190	25		225	250			23	23					44		419	463
	Post	58	42	75	175	11	9	6	26	16	1	67	84					85	52	148	285
	Total	77	42	246	365	36	9	231	276	16	1	90	107					129	52	567	748
NIDR	Pre	12		53	65							8	8					12		61	73
	Post	79	46	47	172					9	45	15	69					88	91	62	241
	Total	91	46	100	237					9	45	23	77					100	91	123	314
NIEHS	Pre	28		79	107													28		79	107
	Post	40	19	33	92													40	19	33	92
	Total	68	19	112	199													68	19	112	199
NEI	Pre	18		25	43					1		5	6					19		30	49
	Post	79	1	41	121					22		22	44					101	1	63	165
	Total	97	1	66	164					23		27	50					120	1	93	[illegible]
NIGMS	Pre	1425		2010	3435			150	150									1425		2160	3585
	Post	293	114	159	566			12	12	45	45	127	217					338	159	298	795
	Total	1718	114	2169	4001			162	162	45	45	127	217					1763	159	2458	4380
NHLI	Pre	23		81	104					45		25	70					68		106	174
	Post	205	53	188	446		1		1	196	22	184	402					401	76	372	849
	Total	228	53	269	550		1		1	241	22	209	472					469	76	478	1023
NINCDS	Pre	8			8							7	7					8		7	15
	Post	189	13	52	254					12	1	67	80					201	14	119	334
	Total	197	13	52	262					12	1	74	87					209	14	126	349
DRR & NLM	Pre							3	3							19	19			22	22
	Post									9		7	16			6	6	9		13	22
	Total							3	3	9		7	16			25	25	9		35	44
NIA	Pre			32	32			48	48											80	80
	Post	9	6	7	22		3	8	11									9	9	15	33
	Total	9	6	39	54		3	56	59									9	9	95	113
NIH Total	Pre	1656	2	2637	4295	25		426	451	249		348	597			19	19	1930	2	3430	5362
	Post	1196	358	719	2273	11	13	26	50	887	246	662	1795			6	6	2094	617	1413	4124
	Total	2852	360	3356	6568	36	13	452	501	1136	246	1010	2392			25	25	4024	619	4843	9486
ADAMHA																					
NIAAA, NIDA & NIMH	Pre	d	d	d	485	d	d	d	1224					d	d	d	110	d	d	d	1819
	Post	d	d	d	166	d	d	d	111					d	d	d	34	d	d	d	311
	Total	d	d	d	651	d	d	d	1335					d	d	d	144	d	d	d	2130
NIH & ADAMHA	Pre				4780				1675				597				129				7181
	Post				2439				161				1795				40				4435
	Total				7219				1836				2392				169				11616

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.

[a]These individuals were supported by awards in the initial year of the NRSA program.

[b]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c]These individuals received their awards initially under the individual research training programs of the PHS prior to FY 1974.

[d]Data are not available.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE III.5 Predoctoral and Postdoctoral Estimated Commitments in FY 1977 by Aggregate Field, Initial Training Authority, and Awarding Institute

1977		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
		NRSA[a]	WPF[b]	PHS[c]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
NIH																					
NIAID	Pre			49	49							98	98							147	147
	Post	26	1	20	47					47	3	42	92					73	4	62	139
	Total	26	1	69	96					47	3	140	190					73	4	209	286
NIAMDD	Pre									3			3					3			3
	Post	11	3		14					239	5		244					250	8		258
	Total	11	3		14					242	5		247					253	8		261
NCI	Pre	144		12	156					236		19	255					380		31	411
	Post	211	15	13	239					345	25	20	390					556	40	33	629
	Total	355	15	25	395					581	25	39	645					936	40	64	1040
NICHD	Pre	19		90	109	25		175	200			17	17					44		282	326
	Post	21	4	56	81	3	1	5	9	21		28	49					45	5	89	139
	Total	40	4	146	190	28	1	180	209	21		45	66					89	5	371	465
NIDR	Pre	13		23	36							8	8					13		31	44
	Post	69	4	23	96					12		11	23					81	4	34	119
	Total	82	4	46	132					12		19	31					94	4	65	163
NIEHS	Pre	36		29	65													36		29	65
	Post	43	3	14	60													43	3	14	60
	Total	79	3	43	125													79	3	43	125
NEI	Pre	18		15	33					1		5	6					19		20	39
	Post	66		16	82					20		14	34					86		30	116
	Total	84		31	115					21		19	40					105		50	155
NIGMS	Pre	1918		1307	3225			102	102									1918		1409	3327
	Post	243		81	324			6	6	45	10	98	153					288	10	185	483
	Total	2161		1388	3549			108	108	45	10	98	153					2206	10	1594	3810
NHLI	Pre	23		24	47					51		11	62					74		35	109
	Post	173	3	106	282					162	4	96	262					335	7	202	544
	Total	196	3	130	329					213	4	107	324					409	7	237	653
NINCDS	Pre	9			9													9			9
	Post	79	5		84													79	5		84
	Total	88	5		93													88	5		93
DRR & NLM	Pre															8	8			8	8
	Post									11			11			2	2	11		2	13
	Total									11			11			10	10	11		10	21
NIA	Pre			20	20			29	29											49	49
	Post	8	2	4	14		1	5	6									8	3	9	20
	Total	8	2	24	34		1	34	35									8	3	58	69
Total	Pre	2180		1569	3749	25		306	331	291		158	449			8	8	2496		2041	4537
	Post	950	40	333	1323	3	2	16	21	902	47	309	1258			2	2	1855	89	660	2604
	Total	3130	40	1902	5072	28	2	322	352	1193	47	467	1707			10	10	4351	89	2701	7141
ADAMHA																					
NIAAA, NIDA & NIMH	Pre	d	d	d	300	d	d	d	716					d	d	d	57	d	d	d	1073
	Post	d	d	d	88	d	d	d	40					d	d	d	20	d	d	d	148
	Total	d	d	d	388	d	d	d	756					d	d	d	77	d	d	d	1221
NIH & ADAMHA	Pre				4049				1047				449				65				5610
	Post				1411				61				1258				22				2752
	Total				5460				1108				1707				87				8362

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.

[a]These individuals were supported by awards in the initial year of the NRSA program.

[b]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c]These individuals received their awards initially under the individual research training programs of the PHS prior to FY 1974.

[d]Data are not available.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE III.6 NIH[a] Predoctoral and Postdoctoral Awards in FY 1975, together with Estimated Commitments for FY 1976 and FY 1977, by Aggregate Field and Research Training Program

FY		Biomedical				Behavioral				Clinical				HSR				Total			
		NRSA[b]	WPF[c]	PHS[d]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
1975	T	1507	101	5708	7316	17	—	619	636	694	83	1706	2483	—	—	30	30	2218	184	8063	10465
	F	963	255	122	1340	11	12	2	25	350	191	13	554	—	—	—	—	1324	458	137	1919
	Total	2470	356	5830	8656	28	12	621	661	1044	274	1719	3037	—	—	30	30	3542	642	8200	12384
1976	T	2327	116	3306	5749	26	—	451	477	915	86	1009	2010	—	—	25	25	3268	202	4791	8261
	F	525	244	50	819	10	13	1	24	221	160	1	382	—	—	—	—	756	417	52	1225
	Total	2852	360	3356	6568	36	13	452	501	1136	246	1010	2392	—	—	25	25	4024	619	4843	9486
1977	T	2898	—	1897	4795	26	—	322	348	1049	10	467	1526	—	—	10	10	3973	10	2696	6679
	F	232	40	5	277	2	2	—	4	144	37	—	181	—	—	—	—	378	79	5	462
	Total	3130	40	1902	5072	28	2	322	352	1193	47	467	1707	—	—	10	10	4351	89	2701	7141
TOTAL	T	6732	217	10911	17860	69	—	1392	1146	2658	179	3182	6019	—	—	65	65	9459	396	15550	25405
	F	1720	539	177	2436	23	27	3	53	715	388	14	1117	—	—	—	—	2458	954	194	3606
	Total	8452	756	11088	20296	92	27	1395	1514	3373	567	3196	7136	—	—	65	65	11917	1350	15744	29011

CODE: T = trainees; F = fellows.

[a]ADAMHA data were not available in sufficient detail to include in this table.

[b]These individuals were supported by awards made in the initial year of the NRSA program.

[c]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[d]These individuals received their awards initially under the individual research training programs of the PHS prior to FY 1974.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE III.7 Research Traineeship and Fellowship Awards in FY 1975 by Aggregate Field, Initial Training Authority, and Awarding Institute

		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
		NRSA[a]	WPF[b]	PHS[c]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
NIH																					
NIAID	T			597	597					19	16	92	127					19	16	689	724
	F	163	25	9	197					8	10	1	19					171	35	10	216
	Total	163	25	606	794					27	26	93	146					190	51	699	940
NIAMDD	T	7		21	28					98		307	405					105		328	433
	F	20	6		26					99	59	2	160					119	65	2	186
	Total	27	6	21	54					197	59	309	565					224	65	330	619
NCI	T	227		170	397					370		275	645					597		445	1042
	F	94	47		141					154	77	1	232					248	124	1	373
	Total	321	47	170	538					524	77	276	877					845	124	446	1415
NICHD	T	30		277	307	17		269	286	14		99	113					61		645	706
	F	55	25	9	89	11	7	1	19	2	7	1	10					68	39	11	118
	Total	85	25	286	396	28	7	270	305	16	7	100	123					129	39	656	824
NIDR	T	37	20	145	202			3	3	5	40	58	103					42	60	206	308
	F	35	16	3	54													35	16	3	54
	Total	72	36	148	256			3	3	5	40	58	103					77	76	209	362
NIEHS	T	51		194	245													51		194	245
	F	16	14		30													16	14		30
	Total	67	14	194	275													67	14	194	275
NEI	T	50		63	113					14		24	38					64		87	151
	F	53	5	6	64					8			8					61	5	6	72
	Total	103	5	69	177					22		24	46					125	5	93	223
NIGMS	T	918	81	3700	4699			243	243	28	27	214	269					946	108	4157	5211
	F	257	9	73	339					4	6		10					261	15	73	349
	Total	1175	90	3773	5038			243	243	32	33	214	279					1207	123	4230	5560
NHLI	T	135		414	549					141		329	470					276		743	1019
	F	72	93	11	176		2		2	62	26	2	90					134	121	13	268
	Total	207	93	425	725		2		2	203	26	331	560					410	121	756	1287
NIDCD	T	46		70	116							294	294					46		364	410
	F	195	9	9	213					12	1	4	17					207	10	13	230
	Total	241	9	79	329					12	1	298	311					253	10	377	640
DRR & NLM	T							9	9	5		14	19			30	30	5		53	58
	F									1	5	2	8					1	5	2	8
	Total							9	9	6	5	16	27			30	30	6	5	55	66
NIA	T	6		57	63			95	95									6		152	158
	F	3	6	2	11		3	1	4									3	9	3	15
	Total	9	6	59	74		3	96	99									9	9	155	173
Total NIH	T	1507	101	5708	7316	17		619	636	694	83	1706	2483			30	30	2218	184	8063	10465
	F	963	255	122	1340	11	12	2	25	350	191	13	554					1324	458	137	1919
	Total	2470	356	5830	8656	28	12	621	661	1044	274	1719	3037			30	30	3542	642	8200	12384
ADAMHA																					
NIAAA, NIDA & NIMH	T	d	d	d	349	d	d	d	1021					d	d	d	120	d	d	d	1490
	F	d	d	d	252	d	d	d	284					d	d	d	33	d	d	d	569
	Total	d	d	d	601	d	d	d	1305					d	d	d	153	d	d	d	2059
NIH & ADAMHA	T				7665				1657				2483				150				11955
	F				1592				309				554				33				2488
	Total				9257				1966				3037				183				14443

CODE: T = trainees; F = fellows.

[a]These individuals were supported by awards in the initial year of the NRSA program.

[b]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c]These individuals received their awards initially under the individual research training program of the PHS prior to FY 1974.

[d]Data are not available.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE III.8 Research Traineeship and Fellowship Estimated Commitments in FY 1976 by Aggregate Field, Initial Training Authority, and Awarding Institute

		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
NIH		NRSA[a]	NPF[b]	PHS[c]	Total	NRSA	NPF	PHS	Total	NRSA	NPF	PHS	Total	NRSA	NPF	PHS	Total	NRSA	NPF	PHS	Total
NIAID	T	6	5	202	213					15	11	282	308					21	16	484	521
	F	26	17	1	44					39	15		54					65	32	1	98
	Total	32	22	203	257					54	26	282	362					86	48	485	619
NIAMDD	T	3			3					157		8	165					160		8	168
	F	12	12		24					48	55		103					60	67		127
	Total	15	12		27					205	55	8	268					220	67	8	295
NCI	T	284		100	384					463		163	626					747		263	1010
	F	36	32		68					59	51		110					95	83		178
	Total	320	32	100	452					522	51	163	736					842	83	263	1188
NICHD	T	33		243	276	26		230	256	14		89	103					73		562	635
	F	44	42	3	89	10	9	1	20	2	1	1	4					56	52	5	113
	Total	77	42	246	365	36	9	231	276	16	1	90	107					129	52	567	748
NIDR	T	58	27	100	185					9	45	23	77					67	72	123	262
	F	33	19		52													33	19		52
	Total	91	46	100	237					9	45	23	77					100	91	123	314
NIEHS	T	66		112	178													66		112	178
	F	2	19		21													2	19		21
	Total	68	19	112	199													68	19	112	199
NEI	T	66		65	131					20		27	47					86		92	178
	F	31	1	1	33					3		-	3					34	1	1	36
	Total	97	1	66	164					23		27	50					120	1	93	214
NIGMS	T	1574	84	2129	3787			162	162	42	30	127	199					1616	114	2418	4148
	F	144	30	40	214					3	15		18					147	45	40	232
	Total	1718	114	2169	4001			162	162	45	45	127	217					1763	159	2458	4380
NHLI	T	172		266	438					187		209	396					359		475	834
	F	56	53	3	112		1		1	54	22		76					110	76	3	189
	Total	228	53	269	550		1		1	241	22	209	272					469	76	478	1023
NIDCD	T	58		51	109							74	74					58		125	183
	F	139	13	1	153					12	1		13					151	14	1	166
	Total	197	13	52	262					12	1	74	87					209	14	126	349
DRR & NLM	T							3	3	8		7	15			25	25	8		35	43
	F									1			1					1			1
	Total							3	3	9		7	16			25	25	9		35	44
NIA	T	7		38	45			56	56									7		94	101
	F	2	6	1	9		3		3									2	9	1	12
	Total	9	6	39	54		3	56	59									9	9	95	113
Total NIH	T	2327	116	3306	5749	26		451	477	915	86	1009	2010			25	25	3268	202	4791	8261
	F	525	244	50	819	10	13	1	24	221	160	1	382					756	417	52	1225
	Total	2852	360	3356	6568	36	13	452	501	1136	246	1010	2392			25	25	4024	619	4843	9486
ADAMHA																					
NIAAA, NIDA & NIMH	T	d	d	d	297	d	d	d	930					d	d	d	109	d	d	d	1336
	F	d	d	d	354	d	d	d	405					d	d	d	35	d	d	d	794
	Total	d	d	d	651	d	d	d	1335					d	d	d	144	d	d	d	2130
NIH & ADAMHA	T				6046				1407				2010				134				9597
	F				1173				429				382				35				2019
	Total				7219				1836				2392				169				11616

CODE: T = trainees; F = fellows.

[a] These individuals were supported by awards in the initial year of the NRSA program.

[b] These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c] These individuals received their awards initially under the individual research training program of the PHS prior to FY 1974.

[d] Data are not available.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE III.9 Research Traineeship and Fellowship Estimated Commitments in FY 1977 by Aggregate Field, Initial Training Authority, and Awarding Institute

		Biomedical Sciences				Behavioral Sciences				Clinical Sciences				Health Services Research				Total			
		NRSA[a]	WPF[b]	PHS[c]	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total	NRSA	WPF	PHS	Total
NIH																					
NIAID	T	7		69	76					15		140	155					22		209	231
	F	19	1		20					32	3		35					51	4		55
	Total	26	1	69	96					47	3	140	190					73	4	209	286
NIAMDD	T	3			3					211			211					214			214
	F	8	3		11					31	5		36					39	8		47
	Total	11	3		14					242	5	39	247					253	8		261
NCI	T	319		25	344					521		39	560					840		64	904
	F	36	15		51					60	25		85					96	40		136
	Total	355	15	25	395					581	25	39	645					936	40	64	1040
NICHD	T	33		146	179	26		180	206	20		45	65					79		371	450
	F	7	4		11	2	1		3	1			1					10	5		15
	Total	40	4	146	190	28	1	180	209	21		45	66					89	5	371	465
NIDR	T	68		46	114					12		19	31					80		65	145
	F	14	4		18													14	4		18
	Total	82	4	46	132					12		19	31					94	4	65	163
NIEHS	T	74		43	117													74		43	117
	F	5	3		8													5	3		8
	Total	79	3	43	125													79	3	43	125
NEI	T	70		31	101					20		19	39					90		50	140
	F	14			14					1			1					15			15
	Total	84		31	115					21		19	40					105		50	155
NIGMS	T	2076		1383	3459			108	108	43	10	98	151					2119	10	1589	3718
	F	85		5	90					2			2					87		5	92
	Total	2161		1388	3549			108	108	45	10	98	153					2206	10	1594	3810
NHLI	T	177		130	307					199		107	306					376		237	613
	F	19	3		22					14	4		18					33	7		40
	Total	196	3	130	329					213	4	107	324					409	7	237	653
NINCDS	T	64			64													64			64
	F	24	5		29													24	5		29
	Total	88	5		93													88	5		93
DRR & NLM	T									8			8			10	10			10	18
	F									3			3								3
	Total									11			11			10	10			10	21
NIA	T	7		24	31			34	34									7		58	65
	F	1	2		3		1		1									1	3		4
	Total	8	2	24	34		1	34	35									8	3	58	69
Total NIH	T	2898		1897	4795	26		322	348	1049	10	467	1526			10	10	3973	10	2696	6679
	F	232	40	5	277	2	2		4	144	37		181					378	79	5	462
	Total	3130	40	1902	5072	28	2	322	352	1193	47	467	1707			10	10	4351	89	2701	7141
ADAMHA																					
NIAAA, NIDA & NIMH	T	d	d	d	268	d	d	d	618				-	d	d	d	62	d	d	d	948
	F	d	d	d	120	d	d	d	138					d	d	d	15	d	d	d	273
	Total	d	d	d	388	d	d	d	756				.	d	d	d	77	d	d	d	1221
NIH & ADAMHA	T				5063				966				1526				72				7627
	F				397				142				181				15				735
	Total				5460				1108				1707				87				8362

CODE: T = trainees; F = fellows.

[a]These individuals were supported by awards in the initial year of the NRSA program.

[b]These individuals received their awards initially under the Weinberger Postdoctoral Research Fellowship program in FY 1974.

[c]These individuals received their awards initially under the individual research training program of the PHS prior to FY 1974.

[d]Data are not available.

SOURCE: Data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

APPENDIX IV

TRAINING PROGRAMS OF NIH AND ADAMHA:

FY 1975 AWARDS BY PROGRAM AREA AND INSTITUTE/DIVISION

The program of research training provided by NIH and ADAMHA in FY 1975 marked the implementation of National Research Service Awards that specified certain conditions under which federally supported research training is given. In accordance with the provisions of the NRSA Act (PL 93-348), support is provided "for research or research training in only those subject areas for which . . . there is a need for personnel" (see Appendix V).

Announcements of the availability of these awards were issued by NIH and ADAMHA shortly after the passage of the NRSA Act of July 1974 (see Appendix VI). These announcements solicited applications for both predoctoral and postdoctoral training grants and fellowships in specific areas of biomedical and behavioral research. The priority areas so identified by NIH and ADAMHA reflect the current need for research personnel as well as the areas of research that are the responsibility of the funding institute/division.

Tables IV.1 through IV. 16, which follow, show the distribution of the predoctoral and postdoctoral research traineeships and fellowships which were awarded by the institutes/divisions of NIH and ADAMHA in FY 1975 by research training program area of the awarding unit. Table IV. 17 is a summary of these distributions.

These classifications of the FY 1975 awards by program area within each institute/division, as well as by one of the four aggregate fields that have been used by the Committee in this report, have been developed and provided by NIH and ADAMHA at the request of the Committee. The Clinical Sciences predoctoral category in 1975 includes only the 543 trainees in the Medical Scientist Program (see Table IV.8) supported by the Institute of General Medical Science (NIGMS). The Committee recognizes that at the predoctoral level <u>any</u> classification of trainees into "basic biomedical sciences" and "clinical sciences," is somewhat arbitrary. In view of the evident difficulty that the several Institutes had in drawing such distinctions to accommodate the Committee's classificatory scheme, particularly in the absence of uniform criteria applicable to the range of subfields, the Committee decided in making its recommendations to include only the Medical Scientist Program within the Clinical Sciences predoctoral category.

The Committee notes that NIGMS in its report to the Committee included the Medical Scientist Program under Basic Biomedical Sciences. However, subsequent discussions with the responsible program officials indicated that in view of the program's unique features, there was justification for its classification by the Committee under the Clinical Sciences category. In like manner, in reviewing in detail the Institutes' classifications of their predoctoral awardees reported under Clinical Sciences, it became clear that the large majority of these were Ph.D. candidates in basic biomedical disciplines working on problems of clinical interest. Thus, these 485 predoctorals (see Table IV. 17) were reclassified by the Committee under Basic Biomedical Sciences in Table 1.1.

TABLE IV.1 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Allergy and Infectious Diseases (NIAID)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Allergy and Immunology	T	129	43	172					58	58				129	101	230
	F		76	76					7	7					83	83
	Total	129	119	248					65	65				129	184	313
Bacteriology and Mycosis	T	147	29	176				2	50	52				149	79	228
	F		19	19					6	6					25	25
	Total	147	48	195				2	56	58				149	104	253
Biochemistry and Physiology	T	1		1										1		1
	F		39	39											39	39
	Total	1	39	40										1	39	40
Parasitology and Medical Entomology	T	64	22	86										64	22	86
	F		20	20											20	20
	Total	64	42	106										64	42	106
Virology	T	137	25	162					17	17				137	42	179
	F		43	43					6	6					49	49
	Total	137	68	205					23	23				137	91	228
TOTAL	T	478	119	597				2	125	127				480	244	724
	F		197	197					19	19					216	216
	Total	478	316	794				2	144	146				480	460	940

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIAID, renamed in 1955 from the National Microbiological Institute, established in 1948, supports research on human diseases caused by infectious organisms and allergic responses and programs designed to apply microbiological findings to specific disease control measures.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.2 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Arthritis	T								53	53					53	53
	F								16	16					16	16
	Total								69	69					69	69
Dermatology	T								31	31					31	31
	F								7	7					7	7
	Total								38	38					38	38
Diabetes	T							2	26	28				2	26	28
	F								25	25					25	25
	Total							2	51	53				2	51	53
Digestive Diseases	T								69	69					69	69
	F								30	30					30	30
	Total								99	99					99	99
Endocrinology	T								63	63					63	63
	F								32	32					32	32
	Total								95	95					95	95
Hematology	T							1	55	56				1	55	56
	F								10	10					10	10
	Total							1	65	66				1	65	66
Kidney and Urologic Diseases	T							1	71	72				1	71	72
	F								19	19					19	19
	Total							1	90	91				1	90	91
Metabolism	T		28	28											28	28
	F		26	26											26	26
	Total		54	54											54	54
Nutrition	T							6	11	17				6	11	17
	F								12	12					12	12
	Total							6	23	29				6	23	29
Orthopedics	T								16	16					16	16
	F								9	9					9	9
	Total								25	25					25	25
TOTAL	T		28	28				10	395	405				10	423	433
	F		26	26					160	160					186	186
	Total		54	54				10	555	565				10	609	619

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIAMDD, organized in 1950, supports research into the causes, prevention, diagnosis and treatment of the various arthritic, rheumatic, and collagen diseases and a broad spectrum of metabolic disorders.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.3 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Cancer Institute (NCI)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Carcinogenesis	T	14	28	42				24	47	71				38	75	113
	F		17	17					28	28					45	45
	Total	14	45	59				24	75	99				38	120	158
Chemotherapy	T	8	18	26				12	30	42				20	48	68
	F		3	3					4	4					7	7
	Total	8	21	29				12	34	46				20	55	75
Drug Development	T	12	17	29				20	28	48				32	45	77
	F		20	20					32	32					52	52
	Total	12	37	49				20	60	80				32	97	129
Epidemiology	T	8	4	12				12	6	18				20	10	30
	F		2	2					3	3					5	5
	Total	8	6	14				12	9	21				20	15	35
Immunology	T	32	41	73				53	67	120				85	108	193
	F		18	18					29	29					47	47
	Total	32	59	91				53	96	149				85	155	240
Multidisciplinary Areas	T	16	24	40				26	39	65				42	63	105
	F															
	Total	16	24	40				26	39	65				42	63	105
Radiation	T	35	56	91				58	86	144				93	142	235
	F		5	5					9	9					14	14
	Total	35	61	96				58	95	153				93	156	249
Tumor Biology	T	13	11	24				20	19	39				33	30	63
	F		48	48					82	82					130	130
	Total	13	59	72				20	101	121				33	160	193
Viral Oncology	T	31	29	60				50	48	98				81	77	158
	F		28	28					45	45					73	73
	Total	31	57	88				50	93	143				81	150	231
TOTAL	T	169	228	397				275	370	645				444	598	1042
	F		141	141					232	232					373	373
	Total	169	369	538				275	602	877				444	971	1415

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NCI, established in 1938, supports research relating to the cause, prevention, diagnosis, and treatment of cancer and supports an active program in cancer control that includes opportunities to develop effective means for therapy, rehabilitation, education, and training in the treatment of disease.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.4 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field And Program Area, National Institute of Child Health and Human Development (NICHD)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Growth and Development	T	12	15	27	104	2	106	5	39	44				121	56	177
	F		23	23		9	9		2	2					34	34
	Total	12	38	50	104	11	115	5	41	46				121	90	211
Mental Retardation	T	4	2	6	72	7	79	6	15	21				82	24	106
	F		7	7		4	4		3	3					14	14
	Total	4	9	13	72	11	83	6	18	24				82	38	120
Perinatal Biology and Infant Mortality	T	152	34	186				9	39	48				161	73	234
	F		18	18		1	1		4	4					23	23
	Total	152	52	204		1	1	9	43	52				161	96	257
Population and Reproduction	T	50	38	88	98	3	101							148	41	189
	F		41	41		5	5		1	1					47	47
	Total	50	79	129	98	8	106		1	1				148	88	236
TOTAL	T	218	89	307	274	12	286	20	93	113				512	194	706
	F		89	89		19	19		10	10					118	118
	Total	218	178	396	274	31	305	20	103	123				512	312	824

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NICHD, established in 1961, supports research in areas related to maternal health, child health, and human development, including research in growth, development, reproduction, prenatal development, maturation, and aging.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.5 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Dental Research (NIDR)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Behavioral Studies	T	2	7	9	1		1	2	3	5				5	10	15
	F		1	1											1	1
	Total	2	8	10	1		1	2	3	5				5	11	16
Caries	T		7	7											7	7
	F		6	6											6	6
	Total		13	13											13	13
Craniofacial Anomolies	T	17	34	51				15	38	53				32	72	104
	F		15	15											15	15
	Total	17	49	66				15	38	53				32	87	119
Mineralization	T	4	2	6										4	2	6
	F		7	7											7	7
	Total	4	9	13										4	9	13
Nutrition	T	8	11	19										8	11	19
	F		2	2											2	2
	Total	8	13	21										8	13	21
Pain Control	T	3	11	14	2		2	3	4	7				8	15	23
	F		4	4											4	4
	Total	3	15	18	2		2	3	4	7				8	19	27
Periodontal Disease	T	13	17	30				2	25	27				15	42	57
	F		15	15											15	15
	Total	13	32	45				2	25	27				15	57	72
Restorative Materials	T	28	6	34										28	6	34
	F		2	2											2	2
	Total	28	8	36										28	8	36
Salivary Secretions	T	4	4	8										4	4	8
	F															
	Total	4	4	8										4	4	8
Soft Tissue Diseases	T	9	15	24				2	9	11				11	24	35
	F		2	2											2	2
	Total	9	17	26				2	9	11				11	26	37
TOTAL	T	88	114	202	3		3	24	79	103				115	193	308
	F		54	54											54	54
	Total	88	168	256	3		3	24	79	103				115	247	362

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIDR, established in 1948, supports research into the causes, prevention, diagnosis, and treatment of oral and dental diseases and related conditions through such disciplines as biochemistry, microbiology, immunology, physiology, anatomy, genetics, bioengineering, and the social and behavioral sciences.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.6 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Environmental Health Sciences (NIEHS)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Environmental Biology	T	20	8	28										20	8	28
	F		9	9											9	9
	Total	20	17	37										20	17	37
Environmental Epidemiology and Statistics	T	23	3	26										23	3	26
	F		2	2											2	2
	Total	23	5	28										23	5	28
Environmental Pathology and Pathophysiology	T	8	8	16										8	8	16
	F		1	1											1	1
	Total	8	9	17										8	9	17
Environmental Toxicology	T	126	49	175										126	49	175
	F		18	18											18	18
	Total	126	69	193										126	69	193
TOTAL	T	177	68	245										177	68	245
	F		30	30											30	30
	Total	177	98	275										177	98	275

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIEHS, established in 1965, supports research in the interrelationships between chemical and physical factors in the environment and human disease and the control of factors adversely affecting the physical and biological status of man.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976

TABLE IV.7 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Eye Institute (NEI)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Cataract	T															
	F		4	4											4	4
	Total		4	4											4	4
Corneal Diseases	T															
	F		6	6											6	6
	Total		6	6											6	6
Developmental Biology	T		6	6					7	7					13	13
	F															
	Total		6	6					7	7					13	13
Epidemiology	T	2	2	4										2	2	4
	F															
	Total	2	2	4										2	2	4
Glaucoma	T															
	F		2	2					3	3					5	5
	Total		2	2					3	3					5	5
Immunology	T		3	3				2	6	8				2	9	11
	F															
	Total		3	3				2	6	8				2	9	11
Physiology and Biochemistry	T	25	55	80				2	21	23				27	76	103
	F															
	Total	25	55	80				2	21	23				27	76	103
Psychophysics and Physiological Optics	T	11	9	20										11	9	20
	F															
	Total	11	9	20										11	9	20
Retinal and Choroidal Diseases	T															
	F		22	22					2	2					24	24
	Total		22	22					2	2					24	24
Sensory/Motor Disorders and Rehabilitation	T															
	F		30	30					3	3					33	33
	Total		30	30					3	3					33	33
TOTAL	T	38	75	113				4	34	38				42	109	151
	F		64	64					8	8					72	72
	Total	38	139	1[illegible]				4	42	46				42	181	223

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NEI, established in 1968, supports research and training in the prevention, diagnosis, and treatment of visual disorders, as well as the rehabilitation of the visually handicapped.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.8 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of General Medical Sciences (NIGMS)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Basic Pathobiology	T	80	193	273										80	193	273
	F		4	4											4	4
	Total	80	197	277										80	197	277
Behavioral Sciences	T				229	14	243							229	14	243
	F															
	Total				229	14	243							229	14	243
Cellular and Molecular Biology[b]	T	1998	46	2044										1998	46	2044
	F	1	122	123										1	122	123
	Total	1999	168	2167										1999	168	2167
Clinical Laboratory Scientists	T															
	F								1	1					1	1
	Total								1	1					1	1
Clinical Pharmacology	T								45	45					45	45
	F								3	3					3	3
	Total								48	48					48	48
Clinical Scientists[c]	T							11	199	210				11	199	210
	F								6	6					6	6
	Total							11	205	216				11	205	216
Genetic Mechanisms and Regulation	T	455	132	587										455	132	587
	F		123	123											123	123
	Total	455	255	710										455	255	710
Medical Scientists Program[d]	T	531		531										531		531
	F	12		12										12		12
	Total	543		543										543		543
Minority Access to Research Careers	T	30	3	33										30	3	33
	F	7	11	18										7	11	18
	Total	37	14	51										37	14	51
Pharmacological Sciences[e]	T	490	46	536										490	46	536
	F	2	37	39										2	37	39
	Total	492	83	575										492	83	565
Systems and Integrative Biology[f]	T	663	32	695										663	32	695
	F		20	20											20	20
	Total	663	52	715										663	52	715
Trauma and Burn Research	T								14	14					14	14
	F															
	Total								14	14					14	14
TOTAL	T	4217	452	4699	229	14	243	11	250	269				4487	724	5211
	F	22	317	339					10	10				22	327	349
	Total	4239	769	5038	229	14	243	11	268	279				4509	1051	5560

CODE: Pre = Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIGMS, established in 1958, supports research in sciences basic to medicine, focusing on the life processes at cellular and subcellular levels of biological organization.

[b]Cellular and Molecular Biology includes Anatomical Sciences, Biochemistry, Biophysics, Microbiology.

[c]Clinical Scientist includes Anesthesiology, Epidemiology, Diagnostic Radiology, General Surgery.

[d]In developing its recommendations the Committee has elected to include this program within the Clinical Sciences (see the introductory section of this Appendix and Table 1.1).

[e]Pharmacological Sciences include Medicinal Chemistry, Pharmacology, Toxicology.

[f]Systems and Integrative Biology includes Biomedical Engineering, Biometry, Clinical Chemistry, Nutrition, Physiology.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.9 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Heart and Lung Institute (NHLI)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Behavioral Sciences	T															
	F					2	2								2	2
	Total					2	2								2	2
Biochemistry	T		5	5											5	5
	F		2	2											2	2
	Total		7	7											7	7
Bioengineering	T	28	10	38										28	10	38
	F		2	2											2	2
	Total	28	12	40										28	12	40
Biostatistics	T	10	3	13										10	3	13
	F		2	2											2	2
	Total	10	5	15										10	5	15
Blood Resources	T	1	27	28										1	27	28
	F		1	1											1	1
	Total	1	28	29										1	28	29
Clinical Investigation	T															
	F								11	11					11	11
	Total								11	11					11	11
Epidemiology	T							8	17	25				8	17	25
	F								9	9					9	9
	Total							8	26	34				8	26	34
Lipid Metabolism	T	2	5	7										2	5	7
	F															
	Total	2	5	7										2	5	7
Metabolism	T															
	F		25	25											25	25
	Total		25	25											25	25
Multidisciplinary/ Cardiovascular	T	34	188	222				34	189	223				68	377	445
	F		31	31					30	30					61	61
	Total	34	219	253				34	219	253				68	438	506
Nutrition	T		10	10											10	10
	F		2	2											2	2
	Total		12	12											12	12
Pathology	T	6	11	17										6	11	17
	F		1	1											1	1
	Total	6	12	18										6	12	18
Pharmacology	T	5	4	9										5	4	9
	F		10	10											10	10
	Total	5	14	19										5	14	19
Physiology	T	61	26	87										61	26	87
	F		45	45											45	45
	Total	61	71	132										61	71	132
Protein Chemistry	T															
	F		11	11											11	11
	Total		11	11											11	11
Pulmonary Diseases	T							33	161	194				33	161	194
	F								40	40					40	40
	Total							33	201	234				33	201	234
Red Blood Cells	T	12	46	58										12	46	58
	F		17	17											17	17
	Total	12	63	75										12	63	75
Renal Hypertension	T	4	25	29				4	24	28				8	49	57
	F															
	Total	4	25	29				4	24	28				8	49	57
Thrombosis	T		26	26											26	26
	F		27	27											27	27
	Total		53	53											53	53
TOTAL	T	163	386	549				79	391	470				242	777	1019
	F		176	176		2	2		90	90					268	268
	Total	163	562	725		2	2	79	481	560				242	1045	1287

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NHLI, expanded in 1969 from the National Heart Institute, established in 1948, supports research into the causes, prevention, methods of diagnosis and treatment of diseases of the heart, blood vessels, lung, and blood; research is also directed to the development, trial, and evaluation of drugs and devices relating to the prevention and treatment of these diseases.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.16 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Neurological and Communicative Disorders and Stroke (NINCDS)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Audiology	T							24	7	31				24	7	31
	F								6	6					6	6
	Total							24	13	37				24	13	37
Biochemistry	T															
	F		1	1											1	1
	Total		1	1											1	1
Child Neurology	T								21	21					21	21
	F															
	Total								21	21					21	21
Clinical Investigation	T															
	F								1	1					1	1
	Total								1	1					1	1
Developmental Neurology	T	2	20	22										2	20	22
	F		12	12											12	12
	Total	2	32	34										2	32	34
Neuroanatomy	T		4	4											4	4
	F		20	20											20	20
	Total		24	24											24	24
Neurobiology	T		12	12											12	12
	F		28	28											28	28
	Total		40	40											40	40
Neurochemistry	T		5	5											5	5
	F		37	37											37	37
	Total		42	42											42	42
Neuroendocrinology	T															
	F		1	1											1	1
	Total		1	1											1	1
Neuroimmunology	T															
	F		3	3											3	3
	Total		3	3											3	3
Neurological Sciences	T		4	4											4	4
	F															
	Total		4	4											4	4
Neurology	T							4	115	119				4	115	119
	F															
	Total							4	115	119				4	115	119
Neuropathology	T		6	6											6	6
	F															
	Total		6	6											6	6
Neuropharmacology	T		8	8											8	8
	F		27	27											27	27
	Total		35	35											35	35
Neurophysiology	T		26	26											26	26
	F		63	63											63	63
	Total		89	89											89	89
Neuropsychology	T															
	F		1	1											1	1
	Total		1	1											1	1
Neuroradiobiology	T															
	F								1	1					1	1
	Total								1	1					1	1
Neuroradiology	T								15	15					15	15
	F								1	1					1	1
	Total								16	16					16	16
Neurosurgery	T								20	20					20	20
	F								3	3					3	3
	Total								23	23					23	23
Neurovirology	T	2	6	8										2	6	8
	F		3	3											3	3
	Total	2	9	11										2	9	11
Otolarynology	T								49	49					49	49
	F															
	Total								49	49					49	49
Sensory Physiology and Biophysics	T	2	19	21										2	19	21
	F		17	17											17	17
	Total	2	36	38										2	36	38
Speech Pathology	T							32	7	39				32	7	39
	F								5	5					5	5
	Total							32	12	44				32	12	44
TOTAL	T	6	110	116				60	234	294				66	344	410
	F		213	213					17	17					230	230
	Total	6	323	329				60	251	311				66	574	640

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NINCDS, established in 1950, supports research in the causes, prevention, diagnosis, and treatment of neurological, sensory and communicative disorders.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.11 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Library of Medicine (NLM)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Information Science	T				5	4	9							5	4	9
	F															
	Total				5	4	9							5	4	9
Computer Science	T										19	11	30	19	11	30
	F															
	Total										19	11	30	19	11	30
TOTAL	T				5	4	9				19	11	30	24	15	39
	F															
	Total				5	4	9				19	11	30	24	15	39

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NLM, which dates to 1836, collects, organizes and makes available biomedical information to investigators, educators and practioners in the field of medicine and health-related sciences.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.12 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, Division of Research Resources (DRR)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Laboratory Animal Science and Medicine	T								19	19					19	19
	F								8	8					8	8
	Total								27	27					27	27

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]DRR, established in 1962, serves as a focal point for the administration and management of a broad range of NIH programs including support of general clinical research centers, regional primate centers, specialized equipment services, and awards for minority schools biomedical support.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.13 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute on Aging (NIA)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Biological, Behavioral and Social Aspects of Aging	T	46	17	63	76	19	95							122	36	158
	F		11	11		4	4								15	15
	Total	46	28	74	76	23	99							122	51	173

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIA, established in 1974, is assigned to serve as a focal point for research on the biological and behavioral basis of human aging.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH, January 9, 1976.

TABLE IV.14 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute on Alcohol Abuse and Alcoholism (NI[illegible])[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Alcoholism	T	11	2	13	11	2	13				11	2	13	33	6	39
	F	2	5	7	2	5	7				1	5	6	5	15	20
	Total	13	7	20	13	7	20				12	7	19	38	21	59

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIAAA, established in 1973, supports research into the causes and prevention of alcoholism and alcohol abuse, as well as training personnel to work in these areas.

SOURCE: FY 1975 data were derived from tabulations supplied by ADAMHA, January 9, 1976. These data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE IV.15 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute on Drug Abuse (NIDA)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Drug Abuse	T															
	F	2	21	23	2	7	9							4	28	32
	Total	2	21	23	2	7	9							4	28	32

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIDA, established in 1973, supports research in the biological, psychosocial, and epidemiological aspects of narcotic addiction and drug abuse, as well as improved health service delivery.

SOURCE: FY 1975 data were derived from tabulations supplied by ADAMHA, January 9, 1976. These data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE IV.16 Number of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field and Program Area, National Institute of Mental Health (NIMH)[a]

Program Area		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total
Development of Behavior	T	243	46	289	537	11	548							780	57	837
	F	121	56	177	106	50	156							227	106	333
	Total	364	102	466	643	61	704							1007	163	1170
Mental Disorder and Maladaptive Behavior	T		47	47	194	22	216							194	69	263
	F	30	15	45	44	20	64							74	35	109
	Total	30	62	92	238	42	280							268	104	372
Mental Health Services Evaluation	T										84	23	107	84	23	107
	F										17	10	27	17	10	27
	Total										101	33	134	101	33	134
Social Problems	T				240	4	244							240	4	244
	F				31	17	48							31	17	48
	Total				271	21	292							271	21	292
TOTAL	T	243	93	336	971	37	1008				84	23	107	1298	153	1451
	F	151	71	222	181	87	268				17	10	27	349	168	517
	Total	394	164	558	1152	124	1276				101	33	134	1647	321	1968

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

[a]NIMH, established in 1949, supports research into the causes, diagnosis, and treatment of psychiatric disorders and the biological and psychosocial factors determining human behavior and development.

SOURCE: FY 1975 data were derived from tabulations supplied by ADAMHA, January 9, 1976. These data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

TABLE IV.17 Summary of Pre- and Postdoctoral Awards in FY 1975 by Aggregate Field, Awarding Institute, and Mechanism of Support (NIH and ADAMHA)

Institute/Divisions		Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research			Total		
		Pre	Post	Total	Pre	Post	Total	Pre[a]	Post	Total	Pre	Post	Total	Pre	Post	Total
NIH																
NIAID	T	478	119	597				2	125	127				480	244	724
	F		197	197					19	19					216	216
	Total	478	316	794				2	144	146				480	460	940
NIAMDD	T		28	28				10	395	405				10	423	433
	F		26	26					160	160					186	186
	Total		54	54				10	555	565				10	609	619
NCI	T	169	228	397				275	370	645				444	598	1042
	F		141	141					232	232					373	373
	Total	169	369	538				275	602	877				444	971	1415
NICHD	T	218	89	307	274	12	286	20	93	113				512	194	706
	F		89	89		19	19		10	10					118	118
	Total	218	178	396	274	31	305	20	103	123				512	312	824
NIDR	T	88	114	202	3		3	24	79	103				115	193	308
	F		54	54											54	54
	Total	88	168	256	3		3	24	79	103				115	247	362
NIEHS	T	177	68	245										177	68	245
	F		30	30											30	30
	Total	177	98	275										177	98	275
NEI	T	38	75	113				4	34	38				42	109	151
	F		64	64					8	8					72	72
	Total	38	139	177				4	42	46				42	181	223
NIGMS	T	4247	452	4699	229	14	243	11	258	269				4487	724	5211
	F	22	317	339					10	10				22	327	349
	Total	4269	769	5038	229	14	243	11	268	279				4509	1051	5560
NHLI	T	163	386	549				79	391	470				242	777	1019
	F		176	176		2	2		90	90					268	268
	Total	163	562	725		2	2	79	481	560				242	1045	1287
NINCDS	T	6	110	116				60	234	294				66	344	410
	F		213	213					17	17					230	230
	Total	6	323	329				60	251	311				66	574	640
NLM and DRR	T				5	4	9		19	19	19	11	30	24	34	58
	F								8	8					8	8
	Total				5	4	9		27	27	19	11	30	24	42	66
NIA	T	46	17	63	76	19	95							122	36	158
	F		11	11		4	4								15	15
	Total	46	28	74	76	23	99							122	51	173
NIH TOTAL	T	5630	1686	7316	587	49	636	485	1998	2483	19	11	30	6721	3744	10465
	F	22	1318	1340		25	25		554	554				22	1897	1919
	Total	5652	3004	8656	587	74	661	485	2552	3037	19	11	30	6743	5641	12384
ADAMHA																
NIDA, NIAAA, NIMH	T	254	95	349	982	39	1021				95	25	120	1331	159	1490
	F	155	97	252	185	99	284				18	15	33	358	211	569
	Total	409	192	601	1167	138	1305				113	40	153	1689	370	2059
NIH and ADAMHA																
GRAND TOTAL	T	5884	1781	7665	1569	88	1657	485	1998	2483	114	36	150	8052	3903	11955
	F	177	1415	1592	185	124	309		554	554	18	15	33	380	2108	2488
	Total	6061	3196	9257	1754	212	1966	485	2552	3037	132	51	183	8432	6011	14443

[a]In developing its recommendations the Committee has elected to include these predoctorals within the Basic Biomedical Sciences (see the introductory section of this Appendix and Table 1.1).

CODE: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D.; T = trainees; F = fellows.

SOURCE: FY 1975 data were derived from tabulations supplied by the institutes and divisions of NIH and ADAMHA, January 9, 1976. ADAMHA data were supplied in terms of program areas which were then classified by the Committee's staff into the four aggregate fields used in this study.

APPENDIX V

PERTINENT SECTIONS OF

THE NATIONAL RESEARCH SERVICE AWARD ACT OF 1974

Title I of the National Research Act of 1974, PL 93-348

July 12, 1974

SHORT TITLE

Sec. 101. This title may be cited as the "National Research Service Award Act of 1974".

FINDINGS AND DECLARATION OF PURPOSE

Sec. 102. (a) Congress finds and declares that--

(1) the success and continued viability of the Federal biomedical and behavioral research effort depends on the availability of excellent scientists and a network of institutions of excellence capable of producing superior research personnel;

(2) direct support of the training of scientists for careers in biomedical and behavioral research is an appropriate and necessary role for the Federal Government; and

(3) graduate research assistance programs should be the key elements in the training programs of the institutes of the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration.

(b) It is the purpose of this title to increase the capability of the institutes of the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration to carry out their responsibility of maintaining a superior national program of research into the physical and mental diseases and impairments of man...

NATIONAL RESEARCH SERVICE AWARDS

Sec. 472. (a)...(3) Effective July 1, 1975, National Research Service Awards may be made for research or research training in only those subject areas for which, as determined under section 473, there is a need for personnel...

STUDIES RESPECTING BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

Sec. 473. (a) The Secretary shall, in accordance with subsection (b), arrange for the conduct of a continuing study to--

(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel;

(2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel;

(3) identify the kinds of research positions available to and held by individuals completing such programs;

(4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under paragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and

(5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1).

(b) (1) The Secretary shall request the National Academy of Sciences to conduct the study required by subsection (a) under an arrangement under which the actual expenses incurred by such Academy in conducting such study will be paid by the Secretary. If the National Academy of Sciences is willing to do so, the Secretary shall enter into such an arrangement with such Academy for the conduct of such study.

(2) If the National Academy of Sciences is unwilling to conduct such study under such an arrangement, then the Secretary shall enter into a similar arrangement with other appropriate nonprofit private groups or associations under which such groups or associations will conduct such study and prepare and submit the reports thereon as provided in subsection (c).

(c) A report on the results of such study shall be submitted by the Secretary to the Committee on Interstate and Foreign Commerce of the House of Representatives and the Committee on Labor and Public Welfare of the Senate not later than March 31 of each year...

APPENDIX VI

NIH AND ADAMHA ANNOUNCEMENTS FOR FY 1975 NRSA PROGRAM

NIH GUIDE for GRANTS and CONTRACTS

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Vol. 3, No. 20, December 13, 1974

INSTITUTIONAL GRANTS FOR NATIONAL RESEARCH SERVICE AWARDS FOR RESEARCH TRAINING

ANNOUNCEMENT

> The provisions of this announcement are tentative in nature and their applicability will depend upon their being consistent with final regulations governing this program. These regulations are now being developed and will be published in the Federal Register, first as a notice of proposed rulemaking. Furthermore, no awards will be made until such regulations have been finally adopted. Such awards are contingent upon the availability of funds.

Under authority of Public Law 93-348, National Research Act, the National Institutes of Health (NIH) will award grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are interested in careers in specified areas of biomedical and behavioral research. (See attachment)

Domestic nonprofit private or non-Federal public institutions may apply for grants to support training programs in specified areas of research from which a number of awards will be made to individuals selected by the institution and the program director. Pre- and postdoctoral trainees may be supported if either or both level(s) of training are justified and approved in the application. The applicant institution must have, or be able to develop, the staff and facilities required for the proposed programs. The training program director at the institution will be responsible for the selection and appointment of trainees to receive National Research Service Awards and for the overall direction of the program.

The proposed program must encompass supervised biomedical research training in the specified areas, and offer opportunity for research training leading toward the research degree, or, in the case of research health scientists, research clinicians, etc., to broaden their scientific background. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

The GUIDE is published at irregular intervals to provide policy, program, and administrative information to individuals and organizations who need to be kept informed of requirements and changes in grants and contracts activities administered by the National Institutes of Health.

Application material Application materials may be obtained from the Grants Inquiries Office, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applications received by	Results announced by
February 15, 1975	June 1975

The NIH reserves the option of rejecting without further review all or part of an application that in its judgment does not fall within the specified areas of research that are currently being supported or for which support of predoctoral training is not offered. Institutions contemplating submission of an application including predoctoral training should contact the appropriate person shown on the list of research areas. (See attachment)

Review and selection NRS grant applications will be evaluated by initial peer review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training proposed. The application will be evaluated on the basis of records and qualifications of participating faculty, the proposed research training objectives and program design, previous training record of the program and its ability to attract high caliber students, institutional commitment, facilities and environment, and relationship of the proposed program goals to need for research training in NIH program areas.

GENERAL PROVISIONS

Eligibility requirements Individuals appointed as trainees on the grant must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of appointment. A non-citizen national is a person who although not a citizen of the United States, owes permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of appointment to the approved training program a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree.

Stipends and other training costs Stipends and allowances requested will be in accordance with the following: For predoctoral, an annual stipend of $3,000 for individuals at all levels, an allowance of $600 annually for each eligible dependent, and an allowance for tuition.

For postdoctorals, the stipend level is determined by the number of years of relevant postdoctoral experience at the time of appointment. Research experience (including industrial), teaching, internship, residency, etc., may be considered relevant experience. An allowance of up to $1,000 for each postdoctoral awardee (in lieu of tuition, fees, and travel) will be provided. No dependency allowance is available for postdoctoral individuals.

Postdoctoral Stipends

Years of Relevant Experience at Entry	Year of Award 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds will be permitted.

In addition to the stipends and allowances for the trainees, the institution may request up to 25% of the total award for other related costs (salaries, equipment, supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Actual indirect costs or 8% of allowable direct costs, whichever is less, may also be requested.

Period of Support Awards for institutional grants may be made for project periods of up to 5 years. However, no individual may receive more than three years of support in the aggregate from a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the trainee and the grantee institution.

Conditions of Award No trainee will be appointed unless he or she has signed and submitted a statement of intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted. Trainee appointments are made for full-time research training and research. Trainees may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

A NRSA recipient may not hold another Federally sponsored fellowship or training award concurrently with a National Research Service Award. A research trainee may, however, accept concurrent eeucational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

Upon completion of the program, recipients of NRS Awards are required to engage in biomedical research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary shall by regulation provide for the waiver or suspension of any payback obligation to an individual whenever compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

Trainees are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Taxability of stipends NIH takes no position on the taxability or non-taxability of National Research Service Award stipends. Recipients of the NRS Award stipend are advised to consult local, State and Federal revenue services.

Research Areas

The research areas in which applications will be accepted on or before February 15, 1975, are listed by awarding units. Applicants are urged to contact the individuals designated below for additional information on details of submission, particularly when predoctoral training is contemplated.

> Applications should be submitted as soon as possible, preferably before the February 15 date, to permit orderly processing and review.

National Institute of General Medical Sciences

For Postdoctoral Training Grants

1. Basic Pathobiology
2. Genetics (with emphasis on Medical Genetics)
3. Clinical Pharmacology
4. Trauma and Burn Research

For Predoctoral Training Grants

1. Cellular and Molecular Biology
2. Genetic Mechanisms and Regulation
3. Pharmacological Sciences
4. Systems and Integrative Biology
5. Medical Scientists Program

Dr. Margaret Carlson (301-496-7585)

National Heart and Lung Institute

1. Epidemiology, biostatistics, behavioral research, population genetics, nutrition and other multidisciplinary programs related to heart and vascular diseases
2. Multidisciplinary training programs in respiratory diseases
3. Blood banking sciences and related programs

Dr. Jerome Green (301-496-7416)

National Institute of Child Health and Human Development

Multidisciplinary or interdisciplinary programs involving the biomedical and/or behavioral social sciences in the following research areas:

1. Adolescence
2. Growth and Development
3. Mental Retardation
4. Perinatology
5. Population
6. Sudden Infant Death Syndrome

Dr. Merrill Read (301-496-5097)

National Institute on Aging

1. Behavioral Sciences
2. Senile Dementia

Dr. Leroy Duncan (301-496-1033)

National Institute of Dental Research

1. Periodontal Disease
2. Soft Tissue Diseases
3. Craniofacial Anomalies
4. Pain Control
5. Nutrition
6. Salivary Secretions
7. Caries
8. Restorative Materials

Dr. Robert J. Schuellein (301-496-7784)

National Institute of Arthritis, Metabolism, and Digestive Diseases

Emphasis on providing opportunity for (1) the clinically trained to acquire thorough grounding in scientific disciplines, including biochemistry, biophysics, cell biology, epidemiology, genetics, physiology, and psychology; and (2) the scientifically trained to participate in clinical investigation in the following:

1. Arthritis, Bone and Skin Diseases
2. Diabetes, Endocrinology and Metabolism
3. Digestive Diseases and Nutrition
4. Kidney Diseases
5. Hematology

Dr. William Batchelor (301-496-7348)

National Eye Institute

1. Research training support relative to diseases of the eye and visual system in:
   a. Immunology
   b. Genetics
   c. Pharmacology
   d. Epidemiology
   e. Physiology and Biochemistry
   f. Developmental Biology
2. Individuals who have completed their residency and clinical training in ophthalmology may apply for research training support under this program.

Dr. Wilford Nusser (301-496-5303)

National Institute of Environmental Health Sciences

1. Environmental Biology (mutagenesis, teratogenesis, carcinogenesis)
2. Environmental Epidemiology and Statistics
3. Environmental Pathology-Pathophysiology
4. Environmental Toxicology

Dr. Cobert Le Munyan (919-549-8411 x3352)

National Institute of Allergy and Infectious Diseases

1. Allergic Diseases
2. Venereal Diseases

Dr. Louis Bourgeois (301-496-7151)

National Cancer Institute

1. Carcinogenesis
2. Chemotherapy
3. Drug Development
4. Epidemiology
5. Immunology
6. Radiation
7. Tumor Biology
8. Viral Oncology

Ms. Helen Denson (301-496-7895)

National Institute of Neurological Diseases and Stroke

1. Developmental Neurology
2. Minority Programs in the Neurosciences
3. Neuroimmunology
4. Neurovirology
5. Sensory Physiology and Biophysics

Dr. Raymond Summers (301-496-7725)

Division of Research Resources

1. Laboratory Animal Science and Medicine

Dr. Charles McPherson (301-496-5451)

NIH GUIDE for GRANTS and CONTRACTS

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Vol. 3, No. 15, October 15, 1974

NATIONAL RESEARCH SERVICE AWARDS FOR INDIVIDUAL POSTDOCTORAL FELLOWS

ANNOUNCEMENT

Under authority of Public Law 93-348, National Research Act, the National Institutes of Health (NIH) provides National Research Service Awards to postdoctoral individuals for training experiences in specified areas of biomedical and behavioral research.

Awards are made to individual applicants, for specified training proposals, selected as a result of a national competition.

The provisions of this announcement are tentative in nature and their final applicability will depend upon their being consistent with final regulations governing this program. These regulations are now being developed and will be published in the Federal Register, first as a notice of proposed rulemaking. Furthermore, no awards will be made until such regulations have been finally adopted. Such awards are contingent upon the availability of funds.

ELIGIBILITY REQUIREMENTS Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g. American Samoa). Individuals on temporary or student visas are not eligible.

As of the beginning date of the proposed fellowship, an applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D. Eng., D.N.S., or equivalent domestic or foreign degree. Applicants must apply in one of the research discipline areas specified by NIH (SEE ATTACHMENT). Proposed study must encompass biomedical research training with an opportunity to carry out supervised research in the specified areas, and offer opportunity to research

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health scientists, research clinicians, etc., to broaden their scientific background, or to extend their potential for research in health-related areas. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise his training and research experience. Applicants may be sponsored by a domestic or foreign non-profit private or non-Federal public institution that has the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work. Training under this program may also be undertaken at the NIH and the Alcohol, Drug Abuse, and Mental Health Administration. The major emphasis of the application should be the research training experience and broadening of scientific competence.

Under exceptional circumstances when such study and opportunity is not available at any domestic institution, an individual may request support for study abroad. Such applicant will be required to provide detailed justification based on the unique facilities and/or training opportunity that are of the nature and caliber that they cannot be found in the U.S. and the particular suitability of the foreign situation, rather than the domestic, to the proposed research.

DOCUMENTS TO BE SUBMITTED The applicant must submit an application for the National Research Service Award and, in addition, arrange for the submission of supporting documents on his or her behalf (reference reports, facilities and commitment statement from the sponsor, etc.). Each applicant must submit a written assurance that the service or payback provision will be complied with in the event of the receipt of an award.

An individual may not have two competing applications pending review concurrently in the NIH National Research Service Individual Postdoctoral Program.

APPLICATION MATERIAL Individuals are encouraged to review the eligibility criteria before requesting application kits from Grants Inquiries, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applications received by	Results announced by the following
January 2	June
May 1	November

ANNUAL STIPENDS AND ALLOWANCES The stipend level is determined by the number of years of relevant postdoctoral experience at the time of award. Research experience (including industrial), teaching, internship, residency, etc., may be considered relevant experience.

Years of Relevant Experience at Entry	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds will be permitted.

No allowance will be provided for dependents or domestic travel. Fellows affiliating with foreign sponsoring institutions will receive a single economy or coach round-trip travel fare to the training site.

Upon request, the NIH will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such expenses as tuition and fees, research supplies, equipment, faculty salary, appropriate medical insurance, travel to domestic scientific meetings, and related items. An allowance is available for the fellow sponsored by a laboratory of the NIH/ADAMHA for domestic meeting travel expenses and appropriate medical insurance.

PERIOD OF SUPPORT No individual may receive more than three years of support in the aggregate by a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

SELECTION OF AWARDEES Applications will be evaluated by initial review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training under the award. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor and training environment, the applicant's research goals, publications, reference reports and other relevant information. NIH program interests and the availability of funds are also considered in the final selection.

NOTIFICATION OF FINAL ACTION An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

ACTIVATION DATE An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD No award will be made to an individual unless he or she has signed and submitted the Statement of Intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Fellowships are awarded for full-time research training and research. Fellows may utilize some of their time in academic studies and clinical duties if such

work is closely related to their research training experience.

A NRSA recipient may not hold another federally sponsored fellowship concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g. G.I. Bill) and loans from Federal funds.

Upon completion of the program, recipients of NRS Awards are expected to engage in biomedical research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

Fellows are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

TAXABILITY OF STIPENDS NIH takes no position on the taxability or non-taxability of National Research Service Awards. No deductions for income tax or social security are withheld by NIH and no annual summary of amounts paid to the fellow are provided. Recipients of the NRS Award are advised to consult local, State, and Federal revenue services.

N O T I C E

Announcement of an Institutional National Research Service Award may be expected in the near future. These grants will be made to eligible institutions to enable them to make National Research Service Awards to individuals selected by them.

For additional information on either of the above programs write: Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014.

For additional information concerning the specified areas of research in which applications will be accepted, write to the Institute or Division concerned at the National Institutes of Health, Bethesda, Maryland 20014.

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The research areas, arranged by institute, in which fellowship applications will be accepted are:

National Institute of General Medical Sciences

1. Anesthesiology
2. Cellular and Molecular Biology
3. Genetics
4. Basic Pathobiology
5. Systems and Integrative Biology (Bioengineering and Physiology)
6. Pharmalogical Sciences
7. Behavioral Sciences
8. Clinical Laboratory Science
9. Trauma Research
10. Epidemiology

(Support is also provided in the Medical Scientist and MARC programs.)

National Heart and Lung Institute

1. Blood Diseases and Resources
2. Heart and Vascular Diseases
3. Lung Diseases

National Institute of Child Health and Human Development

1. Adolescence
2. Adult Development and Aging
3. Growth and Development
4. Infant Morbidity and Mortality
5. Mental Retardation
6. Perinatal Biology
7. Population and Reproduction

National Institute of Dental Research

1. Caries
2. Craniofacial Anomalies
3. Mineralization
4. Nutrition
5. Pain Control
6. Periodontal Disease
7. Restorative Materials
8. Salivary Secretions
9. Soft Tissue Diseases
10. Behavioral Studies

National Institute of Arthritis, Metabolism, and Digestive Diseases

1. Dermatology
2. Diabetes-Endocrinology-Metabolism
3. Digestive Diseases-Nutrition
4. Hematology
5. Kidney Disease and Urology
6. Musculoskeletal (Arthritis and Orthopaedics)

National Eye Institute

1. Investigative Ophthalmology
2. Laboratory Visual Sciences
3. Optometric Research

The above three as related to the following Institute program areas:

a. Retinal and Choroidal Disease
b. Corneal Diseases
c. Cataract
d. Glaucoma
e. Sensory Motor Disorders and Rehabilitation

National Institute of Environmental Health Sciences

1. Environmental Biology-(Mutagenesis)
2. Environmental Epidemiology and Statistics
3. Environmental Pathology-Pathophysiology
4. Environmental Toxicology

National Institute of Allergy and Infectious Diseases

1. Allergic and Immunologic Diseases
2. Bacterial and Fungal Diseases
3. Parasitic Diseases
4. Viral Diseases

National Cancer Institute

1. Carcinogenesis
2. Chemotherapy
3. Drug Development
4. Epidemiology
5. Immunology
6. Radiation
7. Tumor Biology
8. Viral Oncology

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National Institute of Neurological Diseases and Stroke

1. Audiology
2. Clinical Investigation
3. Neuroanatomy
4. Neurobiology
5. Neurochemistry
6. Neuropathology
7. Neuropharmacology
8. Neurophysiology
9. Neuroradiobiology
10. Speech Pathology

Division of Research Resources

1. Laboratory Animal Science and Medicine

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

Institutional Grants for National Research
Service Awards

December, 1974

A N N O U N C E M E N T

This is to announce that under authority of Public Law 93-348, National Research Act, the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will award grants to domestic public and nonprofit private institutions to enable such institutions to make to individuals selected by them National Research Service Awards for predoctoral and postdoctoral training in specified areas of biomedical and behavioral research.

The provisions of this announcement are tentative in nature, and final applicability will depend upon their being consistent with regulations governing this program. These regulations are now being developed and will be published in the Federal Register, first as a notice of proposed rule-making. No grants will be made until such regulations have been finally adopted.

ELIGIBILITY REQUIREMENTS: Domestic public or nonprofit private institutions applying for institutional grants must propose training programs in one of the ADAMHA priority areas specified (SEE ATTACHMENT). The applicant institution must have, or be able to develop, the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work.

The training program director at the institution will be responsible for selection and appointment of individuals to receive National Research Service Awards and for the overall direction of the research training program. The training program must provide opportunities for individual Awardees selected by the institution to carry out supervised research in the specified areas and in addition to broaden their scientific backgrounds or extend their potential for research in health-related areas.

Individuals selected by the program director to be the recipient of National Research Service Awards must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa

at the time of appointment to the training program. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa).

Predoctoral individuals selected to receive Awards must have completed two or more years of graduate work at the time of appointment to the training program. Postdoctoral individuals selected to receive Awards must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree at the time of appointment. National Research Service Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

APPLICATION: Eligible institutions desiring to request support under this program must submit an application on forms which will be provided upon request to the Grants Management Officers of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, or the National Institute of Mental Health, ADAMHA, Rockville, Maryland 20852.

Application Received By	Results Announced
February 1, 1975	June, 1975

STIPENDS AND ALLOWANCES: Stipends and allowances requested in applications for institutional grants will be in accordance with the following: An annual stipend of $3,000 for predoctoral individuals at all levels plus an allowance of $600 for each eligible dependent can be requested; an allowance for tuition is also available.

The stipend level for postdoctoral individuals is determined by the number of years of relevant postdoctoral experience at the time of appointment. Research experience (including industrial), teaching, internship, residency, etc., may be considered relevant experience. An allowance of up to $1,000 for each postdoctoral Awardee (in lieu of tuition, fees, and deposits) will be provided. No dependency allowance is available for postdoctoral individuals.

Years of Relevant Experience at Entry	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$ 10,000	$ 10,400	$ 10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds will be permitted.

INSTITUTIONAL COSTS: Applications for institutional grants may also request up to 25% of the total award for other related costs (salaries, equipment, supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Indirect cost allowances, in accordance with DHEW policy for training grants, also may be requested.

PERIOD OF SUPPORT: Awards for institutional grants may be made for project periods of up to 5 years. Individuals appointed under institutional grants to receive National Research Service Awards may not be supported for more than three years in the aggregate. However, the Secretary or his designee may waive the three year limit for a particular individual based on a review of justification from the Awardee and the grantee institution.

REVIEW PROCESS: Applications for institutional grants will be evaluated by ADAMHA initial review groups and are also subject to review and approval of the appropriate ADAMHA advisory council. Applications will be evaluated on the basis of records and qualifications of participating faculty, the proposed research objectives and program design, the criteria to be employed in selecting individuals to receive Awards, previous training record of the program and its ability to attract high caliber students, institutional commitments, facilities and environment, and relationship of the proposed program goals to need for research training in ADAMHA program areas. The availability of funds is also a consideration in the final selection of programs for award.

NOTIFICATION OF FINAL ACTION: Applicants are notified by the awarding unit of the final action on the application by an award notice or by a letter.

CONDITIONS OF AWARD: The institution must assure that no individual will be appointed under the grant to receive a National Research Service Award unless he or she submits a written statement of intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Upon termination of an Award made to an individual, the recipient is expected to engage in biomedical or behavioral research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated

by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one or the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full obligation the United States is entitled to recover an amount equal to the stipend received from the institutional grant, plus interest, in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary shall by regulation provide for the waiver or suspension of any payback obligation to an individual whenever compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

National Research Service Awards provided under institutional grants are made for full-time research training and research. Awardees may utilize some of their time in course studies and clinical duties if such work is closely related to the research training experience.

An NRSA recipient may not hold another Federally sponsored fellowship or training award concurrently with a National Research Service Award. An awardee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

TAXABILITY OF STIPENDS: ADAMHA takes no position on the taxability or non-taxability of National Research Service Awards. Recipients of the NRS Award are advised to consult the grantee institution and local, State, and Federal revenue offices.

APPLICATION INFORMATION: Requests for application forms and other inquiries regarding the ADAMHA institutional grant for National Research Service Awards should be addressed as follows:

General Mental Health: Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20852

Alcohol Abuse and Alcoholism:	Grants Management Officer National Institute on Alcohol Abuse and Alcoholism 5600 Fishers Lane Rockville, Maryland 20852
Drug Abuse:	Grants Management Officer National Institute on Drug Abuse 11400 Rockville Pike Rockville, Maryland 20852

ATTACHMENT

ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION

National Research Service Award Program
Institutional Awards (For Predoctoral and Postdoctoral Programs)
ADAMHA Priority Areas

Areas in which the three Institutes of the Alcohol, Drug Abuse and Mental Health Administration will offer awards are defined in terms of substantive areas in which research manpower is needed. These interim priorities for ADAMHA programs will be applicable until an ongoing study of research manpower needs is developed (in accordance with the authorizing legislation). Applicants are urged to contact Institute staff for additional information on priorities.

The research areas, arranged by Institute, in which institutional applications will be accepted are:

National Institute on Alcohol Abuse and Alcoholism

- Prevention
- Early Identification
- Organizational Change
- Financing Alcohol Services
- Etiology
- Treatment Evaluation

National Institute on Drug Abuse

- Biomedical Science Studies
- Etiology
- Epidemiology
- Treatment Modalities and Outcome

National Institute of Mental Health

- Development of Behavior (Biological, Psychological, Socio-Cultural Determinants)
- Mental Disorder and Maladaptive Behavior (Etiology, Psychopathology, Treatment, Epidemiology, Prevention)
- Social Problems Related to Mental Health (e.g. Social Organization, Crime and Delinquency, Racism)
- Mental Health Service Delivery Research and Evaluation

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards for Individual
Predoctoral and Postdoctoral Fellows

November 1974

A N N O U N C E M E N T

This is to announce that under authority of Public Law 93-348, National Research Act, the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will provide National Research Service Awards to individuals for predoctoral and postdoctoral training in specified areas of biomedical and behavioral research.

Awards are made to individual applicants, selected as a result of a national competition, for specified research training proposals. Such awards are contingent upon the availability of funds.

The provisions of this announcement are tentative in nature and their final applicability will depend upon their being consistent with final regulations governing this program. These regulations are now being developed and will be published in the Federal Register, first as a notice of proposed rulemaking. Furthermore, no awards will be made until such regulations have been finally adopted.

ELIGIBILITY REQUIREMENTS Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

A predoctoral applicant must have completed two or more years of graduate work as of the proposed activation date of the award and have a doctoral prospectus. A postdoctoral applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D. Eng., D.N.S., or equivalent domestic or foreign degree as of the beginning date of the proposed fellowship.

Applicants must apply in one of the ADAMHA priority areas specified (SEE ATTACHMENT). Proposed study must encompass biomedical or behavioral research

training with an opportunity to carry out supervised research in the specified areas, and offer opportunity to research health scientists, research clinicians, etc., to broaden their scientific background, or to extend their potential for research in health-related areas. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is a part of residency training leading to a medical specialty.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise his training and research experience. Applicants must be sponsored by a domestic or foreign non-profit private or non-Federal public institution that has the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work. Postdoctoral applicants may also be sponsored by a research unit at the ADAMHA or at the National Institutes of Health with appropriate staff and facilities.

With adequate justification, an individual may request support for study abroad. Such applicant will be required to provide detailed information on the unique facilities and/or training opportunity at the proposed location.

DOCUMENTS TO BE SUBMITTED The applicant must submit an application for the National Research Service Award and, in addition, arrange for the submission of supporting documents on his or her behalf (reference reports, facilities and commitment statement from the sponsor, etc.). Each applicant must submit a written assurance that the service or payback provision will be complied with in the event of the receipt of an award.

An individual may not have more than one competing application pending review concurrently in the ADAMHA and the NIH National Research Service Individual Award Program.

APPLICATION MATERIAL Individuals are encouraged to review the eligibility criteria before requesting application kits from the Grants Management Officers of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, or the National Institute of Mental Health, ADAMHA, Rockville, Maryland 20852.

Applications received by	Results announced
January 15	June
May 1	January

ANNUAL STIPENDS AND ALLOWANCES The annual stipend for predoctoral individuals at all levels is $3,000; a dependency allowance of $600 per dependent is also available. The stipend level for postdoctoral individuals is determined by the number of years of relevant postdoctoral experience at the time of award. Research experience (including industrial), teaching, internship, residency, etc., may be considered relevant experience. No dependency allowance is available for postdoctoral individuals.

Years of Relevant Experience at Entry	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$ 10,000	$ 10,400	$ 10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds will be permitted.

No allowance will be provided for domestic travel. Fellows affiliating with foreign sponsoring institutions will receive a single economy or coach round-trip travel fare to the training site.

Upon request, ADAMHA will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such expenses as tuition and fees, research supplies, equipment, faculty salary, appropriate medical insurance, travel to domestic scientific meetings, and related items. An allowance of $1,000 per 12-month period is available for the postdoctoral fellow sponsored by a laboratory of the ADAMHA/NIH for domestic meeting travel expenses and appropriate medical insurance. When an individual award is for research training requiring that the work, or some part of it, be carried on at sites other than the sponsoring institution, an allowance may be requested to support the cost of offsite research as well as travel.

PERIOD OF SUPPORT No individual may receive more than three years of support in the aggregate under a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

SELECTION OF AWARDEES Applications will be evaluated by ADAMHA initial review groups and are also subject to review and approval of the appropriate ADAMHA advisory council. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor's general qualifications, the training environment, the applicant's research goals in terms of specified priority areas, publications, reference reports and other relevant information. ADAMHA program interests and the availability of funds are also considered in the final selection.

NOTIFICATION OF FINAL ACTION An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

ACTIVATION DATE An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD No award will be made to an individual unless he or she has signed and submitted the Statement of Intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Upon completion of the program, recipients of NRS Awards are expected to engage in biomedical or behavioral research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation the United States is entitled to recover an amount equal to the stipend received from the ADAMHA National Research Service Awards, plus interest, in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary shall by regulation provide for the waiver or suspension of any payback obligation applicable to an individual whenever compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

Awards are made for full-time research training and research. Fellows may utilize some of their time in course studies and clinical duties if such work is closely related to their research training experience.

An NRSA recipient may not hold another federally sponsored fellowship concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

Fellows are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer

session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

TAXABILITY OF STIPENDS ADAMHA takes no position on the taxability or non-taxability of National Research Service Awards. No deductions for income tax or social security are withheld by ADAMHA and no annual summary of amounts paid to the fellow are provided. Recipients of the NRS Award are advised to consult local, State, and Federal revenue offices.

APPLICATION INFORMATION Requests for application forms and other inquiries regarding the ADAMHA Individual Predoctoral and Postdoctoral National Research Service Award Program should be addressed as follows:

General Mental Health:	Grants Management Officer National Institute of Mental Health 5600 Fishers Lane Rockville, Maryland 20852
Alcohol Abuse and Alcoholism:	Grants Management Officer National Institute on Alcohol Abuse and Alcoholism 5600 Fishers Lane Rockville, Maryland 20852
Drug Abuse:	Grants Management Officer National Institute on Drug Abuse 11400 Rockville Pike Rockville, Maryland 20852

N O T I C E

Announcement of an Institutional National Research Service Award may be expected in the near future. These grants will be made to eligible institutions to enable them to make National Research Service Awards to individuals selected by them.

(ATTACHMENT)

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Award Program
Individual Predoctoral and Postdoctoral Awards

ADAMHA PRIORITY AREAS

This issuance sets forth interim priorities for ADAMHA programs which will be applicable until an ongoing study of research manpower needs is developed (in accordance with the authorizing legislation). Awards will be made by the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, and the National Institute of Mental Health.

Priority Areas

Priority areas in which the three Institutes of the Alcohol, Drug Abuse and Mental Health Administration will offer awards are defined in terms of substantive areas in which research manpower is needed. Some illustrative examples are given of research in each of these priority areas, along with examples of professions, disciplines and approaches to be emphasized in order to meet these research manpower needs. Applications will be considered for research training which would meet needs in several of these priority areas, such as in the areas of therapy, child abuse and polydrug use. Presentation of research areas is not in order of priority.

National Institute on Alcohol Abuse and Alcoholism

- Prevention

Research is needed on prevention and education focusing on such areas as theories and approaches to prevention, drinking patterns among teenagers and youths and other issues related to prevention and education. Relevant disciplines for training include the various social and behavioral sciences, such as anthropology, epidemiology, psychiatry, psychology, social work and sociology. Emphasis will be on research training in the problems of alcoholism for scientists in these disciplines.

· Early Identification

Another priority research area is prevention by means of early identification. Among relevant disciplines are anthropology, behavioral genetics, economics, personality psychology and social psychology. Research training in such disciplines will be provided for research clinicians and behavioral scientists.

· Organizational Change

Research training in the area of organizational change (that is, how to make institutions and communities sensitive to the needs of alcoholic people) could include such disciplines as industrial psychology, organizational psychology, sociology, social psychology and urban planning. Emphasis will be on research training for specialists in such disciplines as they relate to alcoholism.

· Financing Alcohol Services

Specialists are needed to examine long-term costs of alcoholism, third party payments, and health service systems. Among relevant disciplines are health economics, health planning, political science, systems analysis and operations research.

· Etiology

Researchers trained to study genetic and social factors influencing alcohol tolerance and alcoholism are needed to provide a better understanding of alcoholism problems. Support will be provided to behavioral geneticists and social scientists or individuals desiring such training for work in this field.

· Treatment Evaluation

In the area of treatment, research is needed to determine effective interventions appropriate to various alcoholic populations. Relevant disciplines for research training include clinical psychology and social science disciplines. Emphasis will be placed on research training for clinical-administrators, clinical research training for social scientists.

National Institute on Drug Abuse

· Biomedical Science Studies

Research training will emphasize studies in the biomedical sciences relevant to drug abuse. In particular, training is needed for researchers to immunopharmacology, molecular pharmacology, and neuropharmacology of abused substances.

· Etiology

Research is also needed on complex behavioral, biological and societal factors involved in the etiology of drug abuse. Emphasis will be on providing interdisciplinary training and also training behavioral and social scientists in experimental analysis of social behavior and behavior therapy.

· Epidemiology

An important area of research is the epidemiology of drug use and abuse, especially variations among groups. Relevant disciplines for training include the various behavioral and social sciences. Emphasis will be on research training for epidemiologists and clinicians.

· Treatment Modalities and Outcome

Clinical studies are needed to determine the safety and efficacy of new pharmacologic agents, new modalities for treating drug abuse and variations in therapeutic response and among various population groups. This will require clinical investigators with special training in experimental design and methodology, and evaluation specialists treatment outcome.

National Institute of Mental Health

· Child Mental Health

One important area is studies of effects of the social environment on developmental processes, including studies of parent/child relationships, family dynamics, social institutions and influences, especially in urban areas. Emphasis will be on training of researchers concerned with behavioral problems, training of clinicians for research careers and development of researchers with crossdisciplinary competence. Relevant disciplines include child psychiatry, anthropology, ecology, epidemiology, ethology, nursing, psychology and sociology.

Another priority area of study is the non-intellective aspects of personality, including, for example, affect, creativity, coping mechanisms, motivation, social context and values, and orientation. One area of emphasis will be research training in the social and behavioral sciences for child psychiatrists.

Research is needed in the area of biobehavior, the influences and interrelations of biological and environmental factors. Especially needed is training of researchers in physical anthropology, developmental neurobiology, behavioral genetics, comparative psychology and other social and behavioral sciences.

Another important area is baseline indicator research which will develop knowledge of the prevalance and characteristics of child disorders and problem situations. Emphasis will be on training epidemiologists in methods for child research and in demography.

- Depression (and Suicide)

Priority areas of study include description and classification of depressive disorders, including depression in childhood and in the aged and across cultural and minority groups; identification of high risk populations, with respect to life events, personality and other social and psychological characteristics; treatment techniques; and public education, to identify and channel recognized depressed and/or suicidal individuals. Pertinent disciplines include anthropology, behavioral genetics, biochemistry, clinical psychiatry, epidemiology, psychology, psychometrics and sociology. One area of emphasis will be clinical research training for behavioral scientists and clinicians.

- Schizophrenia

One priority area is research on high risk populations. Relevant disciplines include anthropology, biochemistry, child psychiatry, developmental biology, developmental psychology and genetics. Emphasis will be placed on training of developmental specialists and interdisciplinary scientists.

Another area of emphasis is studies of psychosocial interventions. Disciplines where training is needed include epidemiology, psychiatry, psychotherapy and social psychology. Emphasis will be placed on research training for clinicians and behavioral scientists.

- Brain and Behavior

Research training will be provided in psychobiological aspects of maturation, sensory and motor processes, affective processes, biological bases of behavior and cognitive processes, including intelligence and language. Emphasis will be on training focussed on the interface of physiological, psychological and social variables.

In the area of development of the brain and the central nervous sytem and emergence of organismic behavior, research training will be supported in such neurosciences as developmental neurobiology, comparative neuroanatomy, microneuroanatomy, neurochemistry, neuroembryology and neurophysiology.

Training for research in neurochemical aspects of behavior and its abnormality will be provided in such disciplines as biochemistry, biology, biophysics and neurosciences such as neuropharmacology and neuropsychology.

In the area of behavior and genetics, relevant disciplines include clinical specialties, psychology, physical anthropology and zoology.

• Psychoactive Drugs

Areas of needed study include mechanisms of drug action, early clinical drug evaluation studies, drug trials, ethnopharmacology, sociopharmacology and development of methods. Among relevant disciplines are anthropology, biophysics, biostatistics, drug metabolism, embryology, genetics, neuroendocrinology, neurology, neuropharmacology, organic chemistry, pharmacology, and psychiatry. Emphasis will be placed on research training for clinical researchers and crossdisciplinary specialists such as neuropsychopharmacologists, research child psychiatrists and pediatric neurologists.

• Crime and Delinquency

One priority area is the study of individual violent behavior and its antecedents, including understanding interactions of biological, neurological, psychological and socioenvironmental factors in this kind of behavior. Among pertinent disciplines are anthropology, biochemistry, biology, neurology, psychiatry, psychology and sociology. Emphasis will be placed on crossdisciplinary research training for social and biobehavioral scientists.

Another important area of study is the interactions of law and mental health, including such areas as involuntary commitment, competency to stand trial, right to treatment and standards of treatment. Emphasis will be placed on research training for psychiatrists in the behavioral and social sciences and law, behavioral and social science research training for lawyers and legal research training for behavioral and social scientists.

Still another important area is knowledge about the development and implementation of social policies in crime, delinquency and related social deviance. The relevant disciplines include anthropology, political science, psychology and sociology. Emphasis will be placed on crossdisciplinary research training.

• Aging

Among priority areas of study are behavioral factors involved in chronic brain syndrome; the nature, prevention and treatment of depression in later life; studies of the effect of various life styles and adjustment in later life; personality changes accompanying aging and their consequences for social and psychological functionings; changing social roles and participation among the aged population; and attitudes toward aging and the aged. Relevant disciplines include anthropology, clinical psychology, experimental psychology, psychiatry, social psychology and sociology. Emphasis will be placed on providing research training for psychiatrists and clinical psychologists and training in gerontology for behavioral scientists.

• Minorities

Priority areas include cognitive, psychosocial and emotional development

of racial and ethnic minority group children; developmental processes and conceptual framework of psychopathology in individuals and/or groups of the racial and ethnic minorities; instruments for the assessment of personality adaptational mechanisms and other aspects of personal functioning of minority groups; treatment and rehabilitation models for delivery of mental health services to minority populations. Relevant disciplines for these areas of study include anthropology, economics, nursing, psychiatry, social work, sociology, psychology and systems analysis. Emphasis will be on providing training for minority group researchers.

- Evaluation

Study areas for program evaluation include degree and effectiveness of services provided to various populations (such as rural groups, racial and ethnic minorities, the poor and "middle Americans"); and, degree and effectiveness of training programs for various types of individuals. Relevant disciplines include administration, anthropology, demography, economics, education, epidemiology, political science, psychiatric nursing, psychiatric social work, psychiatry, psychology, social geography and sociology. Emphasis will be placed on training evaluators for research in substantive specialties and training clinical and social science specialists in evaluation methodology.

- Mental Health Services Management

Research is needed on the organization, management and financing of mental health, drug and alcohol services. Among specific areas of study are assessment of community needs; planning and organizing services; resource utilization and productivity; models of financing; standards of care; data systems; dynamics of organizational change; and diffusion and utilization of research results. Among relevant disciplines for research training are anthropology, business administration communication, economics, epidemiology, political science, psychology, public administration and sociology. Emphasis will be on providing crossdisciplinary research training for scientists and managers.

November 1974

APPENDIX VII

NIH AND ADAMHA ANNOUNCEMENTS FOR FY 1976 NRSA PROGRAM

NIH GUIDE for GRANTS and CONTRACTS

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Vol. 4, No. 10, October 24, 1975

INSTITUTIONAL GRANTS FOR NATIONAL RESEARCH SERVICE AWARDS FOR RESEARCH TRAINING

ANNOUNCEMENT

> The provisions of this announcement are subject to any changes which may be necessary as a result of Congressional action on pending legislation extending basic authorization for the program. Such awards will be contingent upon availability of funds.

Under authority of Public Law 93-348, National Research Act, the National Institutes of Health (NIH) will award grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are interested in careers in specified areas of biomedical and behavioral research. (See Attachment One)

Domestic nonprofit private or non-Federal public institutions may apply for grants to support training programs in specified areas of research from which a number of awards will be made to individuals selected by the institution and the program director. Pre- and postdoctoral trainees may be supported if either or both level(s) of training are justified and approved in the application. The applicant institution must have, or be able to develop, the staff and facilities required for the proposed programs. The training program director at the institution will be responsible for the selection and appointment of trainees to receive National Research Service Awards and for the overall direction of the program.

The proposed program must encompass supervised biomedical research training in the specified areas, and offer opportunity for research training leading toward the research degree, or, in the case of research health scientists, research clinicians, etc., to broaden their scientific background. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

The GUIDE is published at irregular intervals to provide policy and administrative information to individuals and organizations who need to be kept informed of requirements and changes in grants and contracts activities administered by the National Institutes of Health.

Supplements, printed on yellow paper, are published by the respective awarding units concerning new projects, solicitations of sources, and requests for proposals.

Application material Application materials may be obtained from the Grants Inquiries Office, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applications received by	Results announced by
January 2	June

The NIH reserves the option of rejecting without further review all or part of an application that in its judgment does not fall within the specified areas of research that are currently being supported or for which support of predoctoral training is not offered. Institutions contemplating submission of an application including predoctoral training should contact the appropriate person shown on the list of research areas. (See Attachment One)

Review and selection NRS grant applications will be evaluated by initial peer review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training proposed. The application will be evaluated on the basis of records and qualifications of participating faculty, the proposed research training objectives and program design, previous training record of the program and its ability to attract high caliber students, institutional commitment, facilities and environment, and relationship of the proposed program goals to need for research training in NIH program areas.

GENERAL PROVISIONS

Eligibility requirements Individuals appointed as trainees on the grant must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of appointment. A non-citizen national is a person who although not a citizen of the United States, owes permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of appointment to the approved training program, a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree.

Stipends and other training costs Stipends and allowances requested will be in accordance with the following: For predoctoral, an annual stipend of $3,900 for individuals at all levels.

For postdoctorals, the stipend level is determined by the number of years of prior relevant postdoctoral experience. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree.

Tuition and travel may be requested. There is no allowance for dependents.

Postdoctoral Stipends

Years of Relevant Experience at Entry	Year of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds is permitted. Other Federal funds may be used for supplementation only if authorized by the program from which such funds are derived.

In addition to the stipends and allowances for the trainees, the institution may request up to 25% of the total award for other related costs (salaries, equipment, supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Actual indirect costs or 8% of allowable direct costs, whichever is less, may also be requested.

Period of support Awards for institutional grants may be made for project periods of up to 5 years. However, no individual may receive more than three years of support in the aggregate from a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the trainee and the grantee institution.

Conditions of award No trainee will be appointed unless a signed Payback Agreement has been submitted indicating his or her intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted. Trainee appointments are made for full-time research training and research. Trainees may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

A NRSA recipient may not hold another Federally sponsored fellowship or training award concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

Upon completion of the program, recipients of NRS Awards are required to engage in biomedical research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary shall by regulation provide for the waiver or suspension of any payback obligation to an individual whenever compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

Trainees are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Taxability of stipends NIH takes no position on the taxability or non-taxability of National Research Service Award stipends. Recipients of the NRS Award stipend are advised to consult local, State, and Federal revenue services.

Notification of final action The applicant will be notified by the awarding unit of the final action on the application by either an award notice or by a letter.

NATIONAL RESEARCH SERVICE AWARDS
FOR INDIVIDUAL POSTDOCTORAL FELLOWS

ANNOUNCEMENT

The provisions of this announcement are subject to any changes which may be necessary as a result of Congressional action on pending legislation extending basic authorization for the program. Such awards will be contingent upon availability of funds.

Under authority of Public Law 93-348, National Research Act, the National Institutes of Health (NIH) provides National Research Service Awards to postdoctoral individuals for training experiences in specified areas of biomedical and behavioral research. (See Attachment Two)

Awards are made to individual applicants, for specified training proposals, selected as a result of a national competition.

Eligibility requirements Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons who although not citizens of the United States, owe permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

As of the beginning date of the proposed fellowship, an applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree. Applicants must apply in one of the research discipline areas specified by NIH. (See Attachment Two) Proposed study must encompass biomedical research training with an opportunity to carry out supervised research in the specified areas, and offer opportunity to research health scientists, research clinicians, etc., to broaden their scientific background, or to extend their potential for research in health-related areas. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise his or her training and research experience. Applicants may be sponsored by a domestic or foreign non-profit private or non-Federal public institution that

has the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work. Training under this program may also be undertaken at the NIH and the Alcohol, Drug Abuse, and Mental Health Administration. The major emphasis of the application should be the research training experience and broadening of scientific competence.

Under exceptional circumstances when such study and opportunity is not available at any domestic institution, an individual may request support for study abroad. Such applicant will be required to provide detailed justification based on the unique facilities and/or training opportunity that are of the nature and caliber that they cannot be found in the U.S. and the particular suitability of the foreign situation, rather than the domestic, to the proposed research.

Documents to be submitted The applicant must submit an application for the National Research Service Award and, in addition, arrange for the submission of supporting documents on his or her behalf (reference reports, facilities and commitment statement from the sponsor, etc.). Each applicant must submit a written assurance that the service or payback provision will be complied with in the event of the receipt of an award.

An individual may not have two competing applications pending review concurrently in the NIH National Research Service Individual Postdoctoral Program.

Application material Individuals are encouraged to review the eligibility criteria before requesting application kits from Grants Inquiries, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applications received by	Results announced by
January 2	June

Annual stipends and allowances The stipend level is determined by the number of years of prior relevant postdoctoral experience. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree.

Postdoctoral Stipends

Years of Relevant Experience at Entry	Year of Award 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds will be permitted. Other Federal funds may be used for supplementation only if authorized by the program from which such funds are derived.

No allowance will be provided for dependents or domestic travel. Fellows affiliating with foreign sponsoring institutions will receive a single economy or coach round-trip travel fare to the training site.

Upon request, the NIH will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such expenses as tuition and fees, research supplies, equipment, faculty salary, appropriate medical insurance, travel to domestic scientific meetings, and related items. An allowance of up to $1,000 is available for the fellow sponsored by a laboratory of the NIH/ADAMHA for domestic meeting travel expenses and appropriate medical insurance.

Period of support No individual may receive more than three years of support in the aggregate by a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

Selection of awardees Applications will be evaluated by initial review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training under the award. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor and training environment, the applicant's research goals, publications, reference reports, and other relevant information. NIH program interests and the availability of funds are also considered in the final selection.

Notification of final action An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

Activation date An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

Conditions of award No award will be made to an individual unless that individual has signed and submitted a Payback Agreement indicating his or her intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Fellowships are awarded for full-time research training and research. Fellows may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

A NRSA recipient may not hold another Federally sponsored fellowship concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

Upon completion of the program, recipients of NRS Awards are expected to engage in biomedical research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation the United States is entitled to recover an amount equal to the stipend received from the NIH plus interest in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

Fellows are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Taxability of stipends NIH takes no position on the taxability or non-taxability of National Research Service Awards. No deductions for income tax or social security are withheld by NIH and no annual summary of amounts paid to the fellow are provided. Recipients of the NRS Award are advised to consult local, State, and Federal revenue services.

For additional information on the above program write: Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014.

For additional information concerning the specified areas of research in which applications will be accepted, write to the Institute or Division concerned at the National Institutes of Health, Bethesda, Maryland 20014.

Research Areas

The research areas in which applications will be accepted on or before January 2, 1976, are listed by awarding units. Applicants are urged to contact the individuals designated below for additional information on details of submission, particularly when predoctoral training is contemplated.

> Applications should be submitted as soon as possible, preferably before the January 2 date, to permit orderly processing and review.

National Institute of General Medical Sciences

For Postdoctoral Training Grants

1. Basic Pathobiology
2. Clinical Pharmacology
3. Genetics (with emphasis on Medical Genetics)
4. Trauma and Burn Research

For Predoctoral Training Grants

1. Cellular and Molecular Biology
2. Genetics
3. Pharmacological Sciences
4. Systems and Integrative Biology
5. Medical Scientists Program

Dr. Margaret Carlson (301-496-7585)

National Institute on Aging

1. Behavioral Sciences
2. Molecular and Cellular Aging

Dr. Leroy Duncan (301-496-1033)

Division of Research Resources

1. Laboratory Animal Science and Medicine

Dr. Charles McPherson (301-496-5451)

National Institute of Arthritis, Metabolism, and Digestive Diseases

Provide opportunity for (1) the clinically trained to acquire thorough grounding in scientific research, including biochemistry, biophysics, cell biology, epidemiology, genetics, physiology, and psychology; and (2) the scientifically trained to participate in biomedical research or clinical investigation relating to:

1. Arthritis and Orthopedics
2. Dermatology
3. Diabetes-Endocrinology-Metabolism
4. Digestive and Liver Diseases and Nutrition
5. Kidney and Urologic Diseases
6. Hematology

Dr. George T. Brooks (301-496-7277)

National Institute of Neurological and Communicative Disorders and Stroke

1. Developmental Neurology
2. Neurobiology
3. Neuroimmunology
4. Neuropathology and/or Otopathology
5. Neurovirology
6. Sensory Physiology and Biophysics
7. Minority Programs in the Neurosciences

Dr. Raymond Summers (301-496-7725)

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National Heart and Lung Institute

1. Epidemiology, Biostatistics, Behavioral Research, Genetics, Nutrition, Protein Chemistry, and Immunochemistry and other multidisciplinary programs related to heart and vascular diseases
2. Multidisciplinary training programs in lung diseases:
   a. Emphesema and Chronic Bronchitis
   b. Epidemiology of Respiratory Diseases
   c. Fibrotic and Immunologic Diseases
   d. Pediatric Pulmonary Diseases
   e. Pulmonary Vascular Diseases
   f. Respiratory Failure
   g. Structure and Function of the Lung
3. Blood Banking Sciences and related programs, Thrombosis, Hemophilia and Coagulation Research, and Hemoglobin Research

Dr. Jerome Green (301-496-7416)

National Institute of Environmental Health Sciences

1. Environmental Biology (mutagenesis, teratogenesis, carcinogenesis)
2. Environmental Epidemiology and Statistics
3. Environmental Pathology-Pathophysiology
4. Environmental Toxicology

Dr. Edward Gardner (919-549-8411 - extension 3357)

National Institute of Child Health and Human Development

Awards provide opportunities for research training in the biological and/or behavioral science aspects of the areas listed below. Primary concern in awarding institutional awards will be given to multidisciplinary or interdisciplinary programs which cannot be provided through individual fellowships. Although major concern is for postdoctoral training, predoctoral training will be considered where a special case for support can be justified.

Research for Mothers and Children:

1. Pregnancy, fetal growth, labor, and neonatal adaptation
2. Sudden infant death syndrome
3. Developmental pharmacology and developmental immunology
4. Nutrition; malnutrition
5. Language development including dyslexia
6. Mental retardation and other developmental disabilities
7. Adolescence, puberty, and problems of physical growth
8. Evaluation of clinical trials

Center for Population Research:

1. Fertilization and reproductive biology
2. Human population genetics
3. Reproductive hormones and reproductive diseases
4. Neuroendocrine control of reproductive processes
5. Fertility, fertility trends, population change, movement, and distribution
6. Population policy

Dr. Merrill Read (301-496-5097)

National Institute of Dental Research

1. Behavioral Studies*
2. Cariology*
3. Craniofacial Anomalies
4. Nutrition
5. Pain Control
6. Periodontal Diseases
7. Restorative Materials
8. Salivary Secretions
9. Soft Tissue Diseases

*Additional information sharply defining this type of training is available on request.

Dr. Robert J. Schuellein (301-496-7784)

National Eye Institute

Laboratory and clinical research training in sciences related to vision and disorders of the visual system:

1. Immunology
2. Genetics
3. Pharmacology
4. Epidemiology
5. Physiology and Biochemistry
6. Developmental Biology
7. Psychophysics and Physiological Optics

Dr. Samuel C. Rawlings (301-496-5301)

National Institute of Allergy and Infectious Diseases

1. Allergic and Immunologic Diseases, and basic Immune Mechanisms
2. Infectious Diseases (including Bacterial, Viral, Parasitic, and Fungal Diseases), and basic Microbiological Mechanisms

Dr. Louis Bourgeois (301-496-7820)

National Cancer Institute

Basic or clinical research training programs in one or more of the following areas:

1. Carcinogenesis
2. Chemotherapy
3. Drug Development
4. Epidemiology
5. Immunology
6. Radiation
7. Tumor Biology
8. Viral Oncology

Dr. Charles Turbyfill (301-496-7803)

The research areas, arranged by Institute, in which fellowship applications will be accepted are:

National Institute of General Medical Sciences

1. Anesthesiology
2. Basic Pathobiology
3. Behavioral Sciences related to Medicine (Ph.D.)
4. Cellular and Molecular Biology
5. Clinical Laboratory Sciences
6. Epidemiology
7. Genetics (including Medical Genetics)
8. Pharmacological Sciences
9. Systems and Integrative Biology (Bioengineering and Physiology)
10. Trauma and Burn Research

(Support is also provided in the Medical Scientist and MARC programs.)

National Heart and Lung Institute

1. Epidemiology, Biostatistics, Behavioral Research, Genetics, Nutrition, Protein Chemistry, and Immunochemistry, and other multidisciplinary programs related to heart and vascular diseases.
2. Multidisciplinary training programs in lung diseases:
   a. Emphysema and Chronic Bronchitis
   b. Epidemiology of Respiratory Diseases
   c. Fibrotic and Immunologic Diseases
   d. Pediatric Pulmonary Diseases
   e. Pulmonary Vascular Diseases
   f. Respiratory Failure
   g. Structure and Function of the Lung
3. Blood Banking Sciences and related programs, Thrombosis, Hemophilia, and Coagulation Research, and Hemoglobin Research.

National Institute of Child Health and Human Development

Provide opportunity for research training in the biological and/or behavioral science aspects of the areas listed below.

Research for Mothers and Children:

1. Pregnancy, fetal growth, labor, and neonatal adaptation
2. Sudden infant death syndrome
3. Developmental pharmacology and developmental immunology
4. Nutrition; malnutrition
5. Language development including dyslexia
6. Mental retardation and other developmental disabilities
7. Adolescence, puberty, and problems of physical growth
8. Evaluation of clinical trials

Center for Population Research:

1. Fertilization and reproductive biology
2. Human population genetics
3. Reproductive hormones and reproductive diseases
4. Neuroendocrine control of reproductive processes
5. Fertility, fertility trends, population change, movement, and distribution
6. Population policy

National Institute on Aging

1. Biological, Behavioral, and Social aspects of aging

Division of Research Resources

1. Laboratory Animal Science and Medicine

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National Institute of Dental Research

1. Behavioral Studies
2. Caries
3. Craniofacial Anomalies
4. Mineralization
5. Nutrition
6. Pain Control
7. Periodontal Disease
8. Restorative Materials
9. Salivary Secretions
10. Soft Tissue Diseases

National Institute of Arthritis, Metabolism, and Digestive Diseases

Provide opportunity for (1) the clinically trained to acquire thorough grounding in scientific research, including biochemistry, biophysics, cell biology, epidemiology, genetics, physiology, and psychology; and (2) the scientifically trained to participate in biomedical research or clinical investigation relating to:

1. Arthritis
2. Orthopedics
3. Dermatology
4. Diabetes
5. Endocrinology
6. Metabolism
7. Digestive Diseases
8. Liver Diseases
9. Nutrition
10. Kidney and Urologic Diseases
11. Hematology

National Cancer Institute

1. Carcinogenesis
2. Chemotherapy
3. Drug Development
4. Epidemiology
5. Immunology
6. Radiation
7. Tumor Biology
8. Viral Oncology

National Eye Institute

Laboratory and clinical research training related to vision and disorders of the visual system:

1. Retinal and Choroidal Disease
2. Corneal Disease
3. Cataract
4. Glaucoma
5. Sensory and Motor Disorders and Rehabilitation

National Institute of Environmental Health Sciences

1. Environmental Biology (Mutagenesis)
2. Environmental Epidemiology and Statistics
3. Environmental Pathology-Pathophysiology
4. Environmental Toxicology

National Institute of Allergy and Infectious Diseases

1. Allergic and Immunologic Diseases, and Basic Immune Mechanisms
2. Infectious Diseases (including bacterial, viral, parasitic, and fungal diseases) and Basic Microbiological Mechanisms

National Institute of Neurological and Communicative Disorders and Stroke

1. Audiology
2. Clinical Investigation
3. Developmental Neurology
4. Neuroanatomy
5. Neurobiology
6. Neurochemistry
7. Neuroimmunology
8. Neuropathology
9. Neuropharmacology
10. Neurophysiology
11. Neuroradiobiology
12. Neurovirology
13. Sensory Physiology and Biophysics
14. Speech Pathology

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

Institutional Grants for National Research
Service Awards

October 10, 1975

A N N O U N C E M E N T

The provisions of this announcement are subject to any changes which may be necessary as a result of Congressional action on pending legislation extending basic authorization for the program. Such awards will be contingent upon availability of funds.

This is to announce that the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will award grants to domestic public and nonprofit private institutions to enable such institutions to make to individuals selected by them National Research Service Awards for predoctoral and postdoctoral training in specified areas of biomedical and behavioral research.

ELIGIBILITY REQUIREMENTS: Domestic public or nonprofit private institutions applying for institutional grants must propose training programs in one of the ADAMHA priority areas specified (SEE ATTACHMENT). The applicant institution must have, or be able to develop, the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work.

The training program director at the institution will be responsible for selection and appointment of individuals to receive National Research Service Awards and for the overall direction of the research training program. The training program must provide opportunities for individual Awardees selected by the institution to carry out supervised research in the specified areas and in addition to broaden their scientific backgrounds or extend their potential for research in health-related areas.

Individuals selected by the program director to be the recipient of National Research Service Awards must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at the time of appointment to the training program. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa).

Predoctoral individuals selected to receive Awards must have completed two or more years of graduate work at the time of appointment to the training program. Postdoctoral individuals selected to receive Awards must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree at the time of appointment. National Research Service Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

APPLICATION: Eligible institutions desiring to request support under this program must submit an application on forms which will be provided upon request to the Grants Management Officers of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, or the National Institute of Mental Health, ADAMHA, Rockville, Maryland 20852.

Application Received By	Results Announced
January 2, 1976	June 1976

STIPENDS AND ALLOWANCES: The annual stipend for predoctoral individuals at all levels is $3,900.

The stipend level for postdoctoral individuals is determined by the number of years of prior relevant postdoctoral experience. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree.

Years of Relevant Experience at Entry	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

There is no allowance provided for dependents. Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds

may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

The applicant institution may request and be provided with funds for tuition and fees and funds to cover the cost of certain types of trainee travel.

INSTITUTIONAL COSTS: Applications for institutional grants may request up to 25% of the total award for other related costs (salaries, equipment, supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Indirect cost allowances, in accordance with DHEW policy for training grants, also may be requested.

PERIOD OF SUPPORT: Awards for institutional grants may be made for project periods of up to 5 years. Individuals appointed under institutional grants to receive National Research Service Awards may not be supported for more than three years in the aggregate. However, the Secretary or his designee may waive the three year limit for a particular individual based on a review of justification from the Awardee and the grantee institution.

REVIEW PROCESS: Applications for institutional grants will be evaluated by ADAMHA initial review groups and are also subject to review and approval of the appropriate ADAMHA advisory council. Applications will be evaluated on the basis of records and qualifications of participating faculty, the proposed research objectives and program design, the criteria to be employed in selecting individuals to receive Awards, previous training record of the program and its ability to attract high caliber students, institutional commitments, facilities and environment, and relationship of the proposed program goals to need for research training in ADAMHA program areas. The availability of funds is also a consideration in the final selection of programs for award.

NOTIFICATION OF FINAL ACTION: Applicants are notified by the awarding unit of the final action on the application by an award notice or by a letter.

CONDITIONS OF AWARD: No trainees will be appointed unless they meet the eligibility requirements and unless they submit a signed Payback Agreement indicating their intent to meet the service or payback provisions required under the law as a condition under which a National Research Award is made and accepted.

Upon termination of an Award made to an individual, the recipient is expected to engage in biomedical or behavioral research, or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize

(a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the specialty in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (2) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one or the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full obligation the United States is entitled to recover an amount equal to the stipend received from the institutional grant, plus interest, in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary may provide, according to regulation, for the waiver or suspension of any payback obligation to an individual when compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

National Research Service Awards provided under institutional grants are made for full-time research training and research. Awardees may utilize some of their time in course studies and clinical duties if such work is closely related to the research training experience.

An NRSA recipient may not hold another Federally sponsored fellowship or training award concurrently with a National Research Service Award. An awardee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

TAXABILITY OF STIPENDS: ADAMHA takes no position on the taxability or non-taxability of National Research Service Awards. Recipients of the NRS Award are advised to consult the grantee institution and local, State, and Federal revenue offices.

APPLICATION INFORMATION: Requests for application forms and other inquiries regarding the ADAMHA institutional grant for National Research Service Awards should be addressed as follows:

General Mental Health:

Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20852

Alcohol Abuse and Alcoholism:	Grants Management Officer National Institute on Alcohol Abuse and Alcoholism 5600 Fishers Lane Rockville, Maryland 20852
Drug Abuse:	Grants Management Officer National Institute on Drug Abuse 11400 Rockville Pike Rockville, Maryland 20852

ATTACHMENT

ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION

National Research Service Award Program

Research areas are described below in which the three Institutes of the Alcohol, Drug Abuse and Mental Health Administration will offer awards. These areas are defined in terms of substantive and problem areas for which research manpower is needed, and examples are included of professions, disciplines and approaches to be emphasized. Presentation of research areas is not in order of priority.

National Institute on Alcohol Abuse and Alcoholism

The research program of the National Institute on Alcohol Abuse and Alcoholism focuses on research on the multiple determinants of alcoholism and on the treatment and rehabilitation of alcoholics and alcohol abusers. The Institute perceives the need for an increased emphasis on quality and quantity of human social, behavioral and treatment research. Therefore, the National Institute on Alcohol Abuse and Alcoholism, will provide support, through the NRSA program, for the training of researchers in these areas.

1. Prevention

Research is needed on prevention and education focusing on such areas as theories and approaches to prevention, drinking patterns among teenagers and youths and other issues related to prevention and education. Relevant disciplines for training include the various social and behavioral sciences, such as anthropology, epidemiology, psychiatry, psychology, social work and sociology. Emphasis will be on research training in the problems of alcoholism for scientists in these disciplines.

2. Early Identification

Another priority research area is prevention by means of early identification. Among relevant disciplines are anthropology, behavioral genetics, economics, personality psychology and social psychology. Research training in such disciplines will be provided for research clinicians and behavioral scientists.

3. Organizational Change

Research training in the area of organizational change (that is, how to make institutions and communities sensitive to the needs of alcoholic people) could include such disciplines as industrial psychology, organizational psychology, sociology, social psychology and urban planning. Emphasis will be on research training for specialists in such disciplines as they relate to alcoholism.

4. Financing Alcohol Services

Specialists are needed to examine long-term costs of alcoholism, third party payments, and health service systems. Among relevant disciplines are health economics, health planning, political science, systems analysis and operations research.

5. Etiology

Researchers trained to study genetic and social factors influencing alcohol tolerance and alcoholism are needed to provide a better understanding of alcoholism problems. Support will be provided to behavioral geneticists and social scientists or individuals desiring such training for work in this field.

6. Treatment Evaluation

In the area of treatment, research is needed to determine effective interventions appropriate to various alcoholic populations. Relevant disciplines for research training include clinical psychology and social science disciplines. Emphasis will be placed on research training for clinical-administrators, clinical research training for social scientists.

National Institute on Drug Abuse

1. Biomedical Science Studies

Research training will emphasize studies in the biomedical sciences relevant to drug abuse. In particular, training is needed for researchers in immunopharmacology, molecular pharmacology, and neuropharmacology of abused substances.

2. Etiology

Research is also needed on complex behavioral, biological and societal factors involved in the etiology of drug abuse. Emphasis will be on providing interdisciplinary training and also training behavioral and social scientists in experimental analysis of social behavior and behavior therapy.

3. Epidemiology

An important area of research is the epidemiology of drug use and abuse, especially variations among groups. Relevant disciplines for training include the various behavioral and social sciences. Emphasis will be on research training for epidemiologists and clinicians.

4. Treatment Modalities and Outcome

Clinical studies are needed to determine the safety and efficacy of new pharmacologic agents to develop and evaluate new modalities for treating drug abuse and to identify and evaluate variations in therapeutic response among various population groups. This will require clinical investigators with special training in experimental design and methodology, and evaluation specialists treatment outcome.

National Institute of Mental Health

The research objective of NIMH is to better understand the determinants of human behavior particularly relevant to mental illness and mental health. Highly trained researchers are required to produce the new knowledge that is needed. Manpower needs in research related to mental health problems are in four general areas: (1) the processes underlying the development and variation of behavior; (2) mental disorders and maladaptive behavior; (3) social problems related to mental health, and (4) mental health services research and evaluation. Support is available in these areas as they are relevant to the NIMH mission.

1. Development of Behavior

As behavior is determined by biological, psychological, and socio-cultural factors, proposals will be accepted for research training in disciplinary or interdisciplinary settings concerned with these determinants. The development and maintenance of mental health throughout the entire lifespan of the individual is of concern with special focus on childhood, adolescence, and old age.

Applications concerned with such areas as behavioral genetics, psychobiological aspects of maturation, sensory and motor processes, affective and cognitive processes, and biological bases of social behavior and social organization are eligible for support. The influence of psychotropic drugs on these processes and the mechanisms of action are of special concern to NIMH. Proposals will be considered also in such areas as development of the brain and the central nervous system, at all levels of organization as they relate to behavior.

Proposals are also invited in such areas of social and cognitive development, perception, memory, and language particularly as they relate to personality research. Other relevant topics include cultural norms of behavior, social structure, social interaction, socio-cultural factors of change and stress, human adaptation, socialization, family dynamics, and in general the effects of the socio-cultural environment on the developmental process.

2. Mental Disorders and Maladaptive Behavior

The mission of the NIMH includes concern for both mental health and mental illness. Proposals are invited for research training in the etiology, diagnosis, psychopathology, treatment, epidemiology and prevention of mental disorders and maladaptive behavior in homogeneous and heterogeneous cultural settings.

Eligible training proposals may be concerned with organic and functional disorders involving the nervous system and behavior in general. Areas of special importance are child mental health and the mental health problems of aging. Critical to NIMH are the areas of schizophrenia, depression and suicide, psychosomatic disorders and psychoneuroses. Applications are invited for research training to identify life events associated with risk populations and the genetics of mental disorders.

3. Social Problems Related to Mental Health

Applications to NIMH are invited with conceptual approaches of special relevance to mental health, in race relations, sex-role differentiation, crime and delinquency, rape, metropolitan problems and poverty.

4. Mental Health Services Research and Evaluation

Research training will be provided in the evaluation of treatment outcomes and mental health service delivery. Within evaluation of treatment outcomes, special emphasis is given to differential effectiveness of treatment modalities, such as psychoactive drugs, behavior modification, and deinstitutionalization, etc.

Special research skills are needed for the assessment of the effectiveness of mental health services provided to individuals belonging to various segments of the client population, such urban and rural groups, minorities, the poor and other socioeconomic populations.

Relevant topics also include planning and organization, management and financing of mental health services to meet community needs. Included among these concerns are standards of care, data systems, accountability and cost-effectiveness, utilization of research results, etc.

Each of the four areas described above require mobilization of both disciplinary and interdisciplinary approaches. In essence the NIMH researcl training programs support research training in disciplines and substantive areas representing four disciplinary clusters as they address problems and priorities of concern to its mission which are discussed above:

Biological Sciences
Psychological Sciences
Social Sciences
Clinical Sciences

Biological Sciences:

This area consists primarily of:

Behavioral Genetics
Biological Anthropology
Neurobehavioral Sciences
- Neuroanatomy
- Neurophysiology
- Neuropsychology
- Neuroendocrinology
- Neurochemistry

Psycho-Neuropharmacology
Ethology

Psychological Sciences:

This cluster consists of:

Child and Development
Social and Ecological
Cognitive
Perception
Sensory
Physiological
Clinical Psychology

Social Sciences:

Primarily concerned with:

Cultural Anthropology
Sociology
Economics
Political Sciences

Clinical Sciences:

Principal ones for mental health are:

Psychiatry
Clinical Psychology
Social Work
Nursing

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards for Individual
Predoctoral and Postdoctoral Fellows

October 10, 1975

ANNOUNCEMENT

The provisions of this announcement are subject to any changes which may be necessary as a result of Congressional action on pending legislation extending basic authorization for the program. Such awards will be contingent upon availability of funds.

This is to announce that the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will provide National Research Service Awards to individuals for predoctoral and postdoctoral training in specified areas of biomedical and behavioral research.

Awards are made to individual applicants, selected as a result of a national competition, for specified research training proposals.

ELIGIBILITY REQUIREMENTS. Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

A predoctoral applicant must have completed two or more years of graduate work as of the proposed activation date of the award and have a doctoral prospectus. A postdoctoral applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D. Eng., D.N.S., or equivalent domestic or foreign degree as of the activation date of the proposed fellowship.

Applicants must apply in one of the ADAMHA priority areas specified (SEE ATTACHMENT). Proposed study must encompass biomedical or behavioral research training with an opportunity to carry out supervised research in the specified areas, and offer opportunity to research health scientists, research clinicians, etc., to broaden their scientific background, or to extend their potential for research in health-related areas. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is a part of residency training leading to a medical specialty.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise his training and research experience. Applicants must be sponsored by a domestic or foreign non-profit private or non-Federal public institution that has the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work. Postdoctoral applicants may also be sponsored by a research unit at the ADAMHA or at the National Institutes of Health with appropriate staff and facilities.

With adequate justification, an individual may request support for study abroad. Such applicant will be required to provide detailed information on the unique facilities and/or training opportunity at the proposed location.

DOCUMENTS TO BE SUBMITTED. Each applicant must (1) submit an application according to instructions, using forms provided by ADAMHA; (2) arrange for submission of supporting documents (reference reports, sponsor's statement, etc.); and (3) submit a signed statement that they have read the payback information and will (if awarded) meet the service or payback provisions required under the law as a condition for accepting the National Research Service Award.

An individual may not have more than one competing application pending review concurrently in the ADAMHA and the NIH National Research Service Individual Award Program.

APPLICATION MATERIAL. Individuals are encouraged to review the eligibility criteria before requesting application kits from the Grants Management Officers of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, or the National Institute of Mental Health, ADAMHA, Rockville, Maryland 20852.

Applications received by	Results announced
January 2, 1976	June 1976

ANNUAL STIPENDS AND ALLOWANCES. The annual stipend for predoctoral individuals at all levels is $3,900.

The stipend level for postdoctoral individuals is determined by the number of years of prior relevant postdoctoral experience. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree.

Years of Relevant Experience at Entry	YEAR OF AWARD 1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

There is no allowance provided for dependents. Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

Funds will not be provided to cover the cost of travel between the fellow's place of residence and the training institution, except (1) the institution may authorize a one-way travel allowance in a case of extreme need or hardship from the institutional allowance, or (2) the ADAMHA awarding component may authorize the cost of a single roundtrip economy or coach ticket to the training site when the approved training is to be at a foreign site or institution.

Upon request, ADAMHA will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution in lieu of tuition and fees and to help defray such expenses as research supplies, equipment, faculty salary, appropriate medical insurance, travel to domestic scientific meetings, and related items. An allowance of $1,000 per 12-month period is available for the postdoctoral fellow sponsored by a laboratory of the ADAMHA/NIH for domestic meeting travel expenses and appropriate medical insurance. When an individual award is for research training requiring that the work, or some part of it, be carried on at sites other than the sponsoring institution, an allowance may be requested to support the cost of off-site research as well as travel.

The sponsoring institution shall be entitled to the full institutional allowance only upon official activation of the award, except that if an individual fellow is not enrolled or engaged in training for more than 6 months of the year of support for which the award was made, one-half of the allowance ($1,500) must be refunded to the Public Health Service.

PERIOD OF SUPPORT. No individual may receive more than three years of support in the aggregate under a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

SELECTION OF AWARDEES. Applications will be evaluated by ADAMHA initial review groups and are also subject to review and approval of the appropriate ADAMHA advisory council. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor's general qualifications, the training environment, the applicant's research goals in terms of specified priority areas, publications, reference reports and other relevant information. ADAMHA program interests and the availability of funds are also considered in the final selection.

NOTIFICATION OF FINAL ACTION. An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

ACTIVATION DATE. An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD. No funds will be made available to an individual unless he or she has signed and submitted the Payback Agreement to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

Upon completion of the program, recipients of NRS Awards are expected to engage in biomedical or behavioral research or teaching for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) if the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in the speciality in a health maintenance organization serving a medically underserved population. (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the stipend received from the ADAMHA National Research Service Awards, plus interest, in accordance with a formula which gives one-half credit to months actually served in the computation of the payback debt.

The Secretary may provide, according to regulation, for the waiver or suspension of any payback obligation applicable to an individual when compliance by the individual is impossible or would involve extreme hardship to the individual and if enforcement of the individual's obligation would be against equity and good conscience.

Awards are made for full-time research training and research. Fellows may utilize some of their time in course studies and clinical duties if such work is closely related to their research training experience.

An NRSA recipient may not hold another federally sponsored fellowship concurrently with a National Research Service Award. An NRSA recipient may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

Fellows are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

TAXABILITY OF STIPENDS. ADAMHA takes no position on the taxability or non-taxability of National Research Service Awards. No deductions for income tax or social security are withheld by ADAMHA and no annual summary of amounts paid to the fellow are provided. Recipients of the NRS Award are advised to consult local, State, and Federal revenue offices.

APPLICATION INFORMATION. Requests for application forms and other inquiries regarding the ADAMHA Individual Predoctoral and Postdoctoral National Research Service Award Program should be addressed as follows:

General Mental Health:	Grants Management Officer National Institute of Mental Health 5600 Fishers Lane Rockville, Maryland 20852
Alcohol Abuse and Alcoholism:	Grants Management Officer National Institute on Alcohol Abuse and Alcoholism 5600 Fishers Lane Rockville, Maryland 20852
Drug Abuse:	Grants Management Officer National Institute on Drug Abuse 11400 Rockville Pike Rockville, Maryland 20852

ATTACHMENT

ALCOHOL, DRUG ABUSE AND MENTAL HEALTH ADMINISTRATION

National Research Service Award Program

Research areas are described below in which the three Institutes of the Alcohol, Drug Abuse and Mental Health Administration will offer awards. These areas are defined in terms of substantive and problem areas for which research manpower is needed, and examples are included of professions, disciplines and approaches to be emphasized. Presentation of research areas is not in order of priority.

National Institute on Alcohol Abuse and Alcoholism

The research program of the National Institute on Alcohol Abuse and Alcoholism focuses on research on the multiple determinants of alcoholism and on the treatment and rehabilitation of alcoholics and alcohol abusers. The Institute perceives the need for an increased emphasis on quality and quantity of human social, behavioral and treatment research. Therefore, the National Institute on Alcohol Abuse and Alcoholism, will provide support, through the NRSA program, for the training of researchers in these areas.

1. Prevention

Research is needed on prevention and education focusing on such areas as theories and approaches to prevention, drinking patterns among teenagers and youths and other issues related to prevention and education. Relevant disciplines for training include the various social and behavioral sciences, such as anthropology, epidemiology, psychiatry, psychology, social work and sociology. Emphasis will be on research training in the problems of alcoholism for scientists in these disciplines.

2. Early Identification

Another priority research area is prevention by means of early identification. Among relevant disciplines are anthropology, behavioral genetics, economics, personality psychology and social psychology. Research training in such disciplines will be provided for research clinicians and behavioral scientists.

3. Organizational Change

Research training in the area of organizational change (that is, how to make institutions and communities sensitive to the needs of alcoholic people) could include such disciplines as industrial psychology, organizational psychology, sociology, social psychology and urban planning. Emphasis will be on research training for specialists in such disciplines as they relate to alcoholism.

4. Financing Alcohol Services

Specialists are needed to examine long-term costs of alcoholism, third party payments, and health service systems. Among relevant disciplines are health economics, health planning, political science, systems analysis and operations research.

5. Etiology

Researchers trained to study genetic and social factors influencing alcohol tolerance and alcoholism are needed to provide a better understanding of alcoholism problems. Support will be provided to behavioral geneticists and social scientists or individuals desiring such training for work in this field.

6. Treatment Evaluation

In the area of treatment, research is needed to determine effective interventions appropriate to various alcoholic populations. Relevant disciplines for research training include clinical psychology and social science disciplines. Emphasis will be placed on research training for clinical-administrators, clinical research training for social scientists.

National Institute on Drug Abuse

1. Biomedical Science Studies

Research training will emphasize studies in the biomedical sciences relevant to drug abuse. In particular, training is needed for researchers in immunopharmacology, molecular pharmacology, and neuropharmacology of abused substances.

2. Etiology

Research is also needed on complex behavioral, biological and societal factors involved in the etiology of drug abuse. Emphasis will be on providing interdisciplinary training and also training behavioral and social scientists in experimental analysis of social behavior and behavior therapy.

3. Epidemiology

An important area of research is the epidemiology of drug use and abuse, especially variations among groups. Relevant disciplines for training include the various behavioral and social sciences. Emphasis will be on research training for epidemiologists and clinicians.

4. Treatment Modalities and Outcome

Clinical studies are needed to determine the safety and efficacy of new pharmacologic agents to develop and evaluate new modalities for treating drug abuse and to identify and evaluate variations in therapeutic response among various population groups. This will require clinical investigators with special training in experimental design and methodology, and evaluation specialists treatment outcome.

National Institute of Mental Health

The research objective of NIMH is to better understand the determinants of human behavior particularly relevant to mental illness and mental health. Highly trained researchers are required to produce the new knowledge that is needed. Manpower needs in research related to mental health problems are in four general areas: (1) the processes underlying the development and variation of behavior; (2) mental disorders and maladaptive behavior; (3) social problems related to mental health, and (4) mental health services research and evaluation. Support is available in these areas as they are relevant to the NIMH mission.

1. Development of Behavior

As behavior is determined by biological, psychological, and socio-cultural factors, proposals will be accepted for research training in disciplinary or interdisciplinary settings concerned with these determinants. The development and maintenance of mental health throughout the entire lifespan of the individual is of concern with special focus on childhood, adolescence, and old age.

Applications concerned with such areas as behavioral genetics, psychobiological aspects of maturation, sensory and motor processes, affective and cognitive processes, and biological bases of social behavior and social organization are eligible for support. The influence of psychotropic drugs on these processes and the mechanisms of action are of special concern to NIMH. Proposals will be considered also in such areas as development of the brain and the central nervous system, at all levels of organization as they relate to behavior.

Proposals are also invited in such areas of social and cognitive development, perception, memory, and language particularly as they relate to personality research. Other relevant topics include cultural norms of behavior, social structure, social interaction, socio-cultural factors of change and stress, human adaptation, socialization, family dynamics, and in general the effects of the socio-cultural environment on the developmental process.

2. Mental Disorders and Maladaptive Behavior

The mission of the NIMH includes concern for both mental health and mental illness. Proposals are invited for research training in the etiology, diagnosis, psychopathology, treatment, epidemiology and prevention of mental disorders and maladaptive behavior in homogeneous and heterogeneous cultural settings.

Eligible training proposals may be concerned with organic and functional disorders involving the nervous system and behavior in general. Areas of special importance are child mental health and the mental health problems of aging. Critical to NIMH are the areas of schizophrenia, depression and suicide, psychosomatic disorders and psychoneuroses. Applications are invited for research training to identify life events associated with risk populations and the genetics of mental disorders.

3. Social Problems Related to Mental Health

Applications to NIMH are invited with conceptual approaches of special relevance to mental health, in race relations, sex-role differentiation, crime and delinquency, rape, metropolitan problems and poverty.

4. Mental Health Services Research and Evaluation

Research training will be provided in the evaluation of treatment outcomes and mental health service delivery. Within evaluation of treatment outcomes, special emphasis is given to differential effectiveness of treatment modalities, such as psychoactive drugs, behavior modification, and deinstitutionalization, etc.

Special research skills are needed for the assessment of the effectiveness of mental health services provided to individuals belonging to various segments of the client population, such urban and rural groups, minorities, the poor and other socioeconomic populations.

Relevant topics also include planning and organization, management and financing of mental health services to meet community needs. Included among these concerns are standards of care, data systems, accountability and cost-effectiveness, utilization of research results, etc.

Each of the four areas described above require mobilization of both disciplinary and interdisciplinary approaches. In essence the NIMH research training programs support research training in disciplines and substantive areas representing four disciplinary clusters as they address problems and priorities of concern to its mission which are discussed above:

Biological Sciences
Psychological Sciences
Social Sciences
Clinical Sciences

Biological Sciences:

This area consists primarily of:

Behavioral Genetics
Biological Anthropology
Neurobehavioral Sciences
- Neuroanatomy
- Neurophysiology
- Neuropsychology
- Neuroendocrinology
- Neurochemistry

Psycho-Neuropharmacology
Ethology

Psychological Sciences:

This cluster consists of:

Child and Development
Social and Ecological
Cognitive
Perception
Sensory
Physiological
Clinical Psychology

Social Sciences:

Primarily concerned with:

Cultural Anthropology
Sociology
Economics
Political Sciences

Clinical Sciences:

Principal ones for mental health are:

Psychiatry
Clinical Psychology
Social Work
Nursing

GLOSSARY

Aggregate Fields--In this report, the fields of biomedical and behavioral research have been divided for analytical purposes into four broad categories or aggregate fields: 1) basic biomedical sciences, 2) behavioral sciences, 3) clinical sciences, and 4) health services research. The NIH and ADAMHA trainees and fellows are classified by the agencies according to the discipline in which their training is received. The following listings relate these training disciplines to the four categories employed in this report.

Basic Biomedical Sciences

Training Disciplines

Anatomy
Biochemistry
Biophysics
Cell Biology
Engineering, Health Related
Genetics
Microbiology
Pathology
Pharmacology/Toxicology
Physiology
Biology, Other
Other Fields Included
- Botany
- Chemistry
- Earth Sciences and Agriculture
- Ecology
- Engineering
- Entomology
- Environmental Sciences
- Hydrobiology
- Mathematics
- Nutrition
- Pharmacy
- Physics
- Radiation, Nonclinical
- Zoology

Behavioral Sciences

Training Disciplines

- Anthropology
- Education, Counseling and Guidance
- Mental Health
- Psychology
  - Abnormal
  - Clinical
  - Comparative and Animal
  - Developmental
  - General and Experimental
  - Personality
  - Physiological
  - Other Psychological Areas
- Social Psychology
- Sociology

Clinical Sciences

Training Disciplines

- Dentistry
- Medicine and Surgery
  - Allergy
  - Anesthesiology
  - Geriatrics
  - Internal Medicine
    - Cardiovascular Diseases
    - Clinical Nutrition
    - Connective Tissue Diseases
    - Dermatology/Syphilology
    - Diabetes
    - Endocrinology
    - Gastroenterology
    - Hematology
    - Infectious Diseases
    - Liver Diseases
    - Metabolic Diseases
    - Nuclear Medicine
    - Oncology
    - Pulmonary Diseases
    - Renal Diseases
    - Tropical Medicine
    - Internal Medicine, Other
  - Neurology
  - Neuropsychiatry
  - Obstetrics/Gynecology
  - Ophthalmology/Optometry
  - Otorhinolaryngology
  - Pediatrics
  - Preventive Medicine
  - Psychiatry
  - Radiology
  - Surgery
- Veterinary Medicine
- Clinical Sciences, Other

Health Services Research

Training Disciplines

Biostatistics
Epidemiology
Health Administration
Hospital and Medical Care
Public Health
- Accident Prevention
- Air Pollution
- Disease Prevention
- Environmental Engineering
- Food Protection
- Maternal and Child Health
- Occupational Health
- Water Pollution Control

Other Health Related Professions

Committee--Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel.

Doctorates:

Academic--received Ph.D. or equivalent degree.

Professional--received M.D., D.D.S., D.V.M., or other health professions doctorate.

Econometrics--the branch of economics dealing with the estimation and testing of economic models.

Enrichment--displacement within the labor force of less highly trained personnel (with M.A./M.S. or lower level degrees) by individuals with doctorate degrees.

Field Switching--the movement of individuals between and within fields of training and fields of employment.

Medical Scientist Training Program--broad, institutionally based programs, sponsored by NIH, designed to assist universities and their medical schools in providing selected trainees with the essential scientific and medical background needed for a career as a medical scientist, generally leading to a combined M.D./Ph.D. degree.

National Institutes of Health (NIH); Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA); Health Resources Administration (HRA)--federal agencies of the Public Health Service, Department of Health, Education, and Welfare that provide the primary sources of support for biomedical and behavioral research and research training. The largest

agencies, NIH and ADAMHA, are organized into institutes that pursue various health problems.

National Research Service Award Act (NRSA Act, PL 93-348, 1974)--the Act under which this study is undertaken. It charges the Committee with investigating the nation's training needs in the biomedical and behavioral sciences. For sections of this Act pertinent to this study, see Appendix V.

Panel--refers to any of four specifically cited disciplinary panels associated with this study--Basic Biomedical Sciences, Behavioral Sciences, Clinical Sciences, or Health Services Research--or to the Data and Studies Panel, which provides advice and analytical support to the disciplinary panels and to the Committee.

President's Biomedical Research Panel--enacted as part of PL 93-352 (1974), this panel is charged with advising Congress and the President by April 1976 on policy issues relating to the subject, content, organization, and operation of biomedical and behavioral research sponsored by NIH and NIMH.

Training Levels:

Predoctoral--study in a graduate program by pre-Ph.D. students and by pre-M.D.'s who are engaged in full-time research training for a minimum of 8 months in a calendar year. Beyond what is normally considered graduate education, predoctoral training, as used in this report, also includes clinical science training in the Medical Science Training Program often leading to a combined M.D./Ph.D. degree.

Postdoctoral--specialized research training taking place after receipt of a Ph.D. or health profession degree.

Post-Ph.D.--specialized research training taking place after receipt of a Ph.D. degree.

Postprofessional--research training taking place after receipt of a medical, dental, veterinary, or other health profession degree.

Training Mechanisms (see also Chapter 2):

Fellowship--awards made directly to the individual, largely in the form of a stipend, from a variety of sources, such as the federal government, voluntary

health organizations, foundations, and universities; may include an institutional subvention.

Training grant--awarded to nonprofit private or nonfederal public institutions through peer review competition, generally for 5-year renewable periods; in addition to student support, includes institutional program support for maintenance of the training environment.

Research assistantship--graduate student support obtained through a research grant or contract to a faculty member; research associateships are similar awards at the postdoctoral level.

Teaching assistantship--graduate student support provided for teaching services; not specifically designed for research training.

Self/private support--derives from personal resources, including work, loans, and spouse and/or family.

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